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## Railway Staff Negotiation Machinery

ON Tuesday the scheme for setting up new machinery of negotiation for railway staff was approved at a meeting in London by all parties, and as from today (March 1) the arrangement comes into operation. As recorded on page 128 of our issue of January 25, it provides for questions being dealt with in discussion locally, sectionally, and on a national basis. Where matters cannot be settled even by the Railway Staff National Council representing the three trade unions and the four main-line railways, there is provision for reference by consent to the Railway Staff National Tribunal of three members (one nominated by the trade unions and one by the railway companies), of whom the Chairman will be appointed by agreement or, failing this, by the Minister of Labour. When a month ago agreement was reached by the railway and union representatives we commented that it was a triumph of common sense and reflected the good will on both sides which alone could make a satisfactory arrangement. Now that the unanimous recommendation for acceptance of the special joint negotiating committee has been formally adopted by all the trade unions, it is confidently anticipated that March 1 will mark the beginning of a new and more effective era of staff negotiation than heretofore.

## The L.N.E.R. Dividend

The dividend of  $3\frac{1}{2}$  per cent. for the whole year 1934 on the £48,222,669 of London & North Eastern Railway 4 per cent. preference stock which was announced last Friday afternoon was well received, as the more optimistic forecasts did not go beyond  $3\frac{1}{2}$  per cent. In comparison with 2 per cent. for the year 1933. Ranking with it is the dividend of  $4\frac{1}{8}$  per cent. for the year on the £4,014,000 of 5 per cent. redeemable preference stock (1955) which received only  $2\frac{1}{2}$  per cent. for 1933. These two dividends together will require about £655,500 more than was paid on these stocks for 1933. They are made possible by again transferring £50,000 from general reserve, and by reducing the carry forward from £56,643 to £43,033, but against this the substantial sum of £538,000 is being allocated from revenue to meet the cost of renewals of rolling stock on the 1934 programme not completed within that year. From the interim statement published on July 27, 1934, it appears that in the first half of the year there was an increase in the net receipts from all sources of £686,000. For the second half of the year the increase in the published gross railway traffics was £528,000.

## The Week's Traffics

The declines in passenger receipts recorded by all companies except the Southern during the seventh week of 1935 were followed by increases in every case for the period under review. The most remarkable recovery is that of the L.M.S.R., which has converted a drop of £7,000 into an increase of £1,000. Aggregate passenger receipts for the eight weeks are therefore maintained on the right side, their total of £7,941,000 being £150,000 better than at the same period of 1934 and an improvement of £10,000 on the advance noted last week. In freight traffic, the Great Western alone has escaped a decrease under general goods, having exactly maintained its 1934 figures, but its aggregate advance under this head has been reduced from £18,000 to £10,000.

	8th Week				Year to date.	
	Pass., &c.	Goods, &c.	Coal, &c.	Total.	Inc. or dec.	%
L.M.S.R. .. +	1,000	9,000	17,000	25,000	34,000	- 0.40
L.N.E.R. .. +	2,000	16,000	20,000	34,000	94,000	- 1.46
G.W.R. .. +	2,000	—	10,000	8,000	10,000	+ 0.29
S.R. .. +	5,000	8,500	4,500	8,000	19,000	- 0.73

Receipts of the Great Northern Railway (Ireland), which last week showed no change, have advanced by £50.

## Mersey Railway and Omnibuses

At the annual meeting of the Mersey Railway Company, which is reported in our news section, allusion was made in the Chairman's speech to the matter of omnibus traffic through Queensway (the Mersey road tunnel) which was opened in July last and forms a roadway between Liverpool and Birkenhead. In the Mersey Tunnel Act of 1925 which authorised the roadway an agreed section was inserted giving the railway company a limited protection against omnibus competition by means of tolls charged by the Tunnel Joint Committee for the use of the roadway. The section also provides that when these tolls cease to be levied omnibus fares through the roadway shall be fixed by the Minister of Transport at a certain minimum after giving the railway company an opportunity of being heard. At present no regular service of omnibuses uses the road tunnel, but the Traffic Commissioners have reserved their decision on applications by Crosville Motor Services Limited to extend to Liverpool via Queensway two stage carriage services from North Wales, which now terminate in Birkenhead. The applications contained a proviso that no passengers were to be

picked up within an area of 8 miles from the Birkenhead Town Hall for conveyance to Liverpool, and in the reverse direction no passengers were to be picked up in Liverpool for conveyance within the 8 miles area on the Cheshire side. It may be remembered that in 1906 Parliament refused powers to the railway company to run motor buses to feed its stations on the Birkenhead side, and that in the same year, in consequence of an injunction obtained at the instance of the local authorities, the company discontinued a motor bus service it had begun in 1905.

\* \* \* \*

### Overseas Railway Traffics

A welcome change has taken place in Argentine railway traffics during the past fortnight, and for the two weeks each of the four larger British-owned companies has registered increases in receipts both in sterling and currency. In the average rate of exchange there has been little variation, as it has stood at 16·93 pesos to the £ for the past fortnight, comparing with 16·57 and 16·76 respectively for the corresponding weeks in 1934. The sterling increases during the past two weeks have been £68,999 on the Buenos Ayres Great Southern, £46,083 on the Central Argentine, £13,507 on the Buenos Ayres Western, and £12,843 on the Buenos Ayres & Pacific. In the same period the Entre Rios has improved its position to the extent of £4,746, but the Argentine North Eastern is only £679 up. Last year the 33rd week was Carnival week.

	No. of Week	Weekly Traffics £	Inc. or Decrease £	Aggregate Traffic £	Inc. or Decrease £
Buenos Ayres & Pacific ..	34th	97,755	+ 8,197	2,442,357	- 384,343
Buenos Ayres Great Southern ..	34th	203,308	+ 29,024	4,688,656	- 778,182
Buenos Ayres Western ..	34th	53,160	+ 5,308	1,468,535	- 308,044
Central Argentine ..	34th	124,442	+ 17,867	4,010,922	- 594,675
Canadian Pacific ..	7th	415,600	- 13,200	2,954,800	- 118,000
Bombay, Baroda & Central India	46th	187,050	- 13,200	7,229,400	+ 324,450

\* \* \* \*

### The G.W.R. Meeting

At the annual meeting on Wednesday the Chairman had a tale of all-round progress during the past year to unfold to the shareholders, except as to exports of coal from South Wales ports. Of the increase in revenue only 40 per cent. was offset by the increase in expenditure, and this low ratio of expenditure indicates that the company is reaping the benefit of its previous outlay in improving the facilities for handling traffic. There was, in fact, a marked advance in general operating efficiency. With a satisfactory trade outlook, and in view of the fact that reserves for all purposes remain at a high figure and that the undertaking has been fully and efficiently maintained, the directors were amply justified in maintaining the dividend of 3 per cent. on the consolidated ordinary stock even though it was not fully earned from the profits of the year. The company has paid a dividend on its ordinary stock continuously since 1870, when the various stocks were consolidated, and for this long period of 65 years the rate has never been less than 3 per cent. This year is, of course, one of exceptional interest as August 31 will mark the centenary of the company's incorporation. Expressing his belief in the continuance of the improvement in trade the Chairman concluded an inspiring address on a note of high encouragement.

\* \* \* \*

### The Southern Railway Meeting

Figures quoted by Mr. Holland-Martin yesterday demonstrate the magnetic power of electrification in drawing traffic. During 1934 the total passenger journeys were 338,000,000, a record for the company, the previous highest having been 330,000,000 in 1930. Compared with 1933 the increase was 13,600,000 of which no fewer than 11,000,000 were on electrified sections. Total passenger

traffic receipts on electrified lines advanced by £302,000. Despite a decrease in the number of ships in and out of Southampton Docks, there was a slight increase in passengers and a substantial increase in merchandise. That people are taking the broadcast advice to eat more fruit is indicated by the arrival of the record quantity of 1,850,000 bunches of bananas during the year. Referring to the successful rating appeal, the Chairman estimated the annual saving at about £300,000—always provided the recent decision was upheld by the House of Lords, in the event of an appeal. Improved results were general compared with 1933, and a notable feature mentioned by the Chairman was that of 1,800,000 tons of coal put on rail by the Kent collieries, about a quarter was taken by the Southern Railway. A report of the meeting will be given next week.

\* \* \* \*

### The Future of the Agency of the Burma Railways

The appointment of Mr. J. E. M. Rowland—whose portrait and biography we publish on another page—as Agent of the Burma Railways, inevitably draws attention to the future of that system, and more particularly the status of the Agent in Burma, should the Bill for the Constitutional Reform of India and Burma become law. If the recommendations of the Joint Committee on Indian Constitutional Reform are adopted, the importance of the Agency of the Burma Railways will be greatly enhanced. As set forth in our editorial on page 88 in the issue of January 19, 1934, the Agent, under the new Constitution, would also become Chief Commissioner and President of the Board of Railway Management, appointed by the Governor of Burma at his discretion; he would moreover, have right of access to the Governor. An experienced railwayman is automatically assured as Chief Commissioner as "he must have expert knowledge and practical training in the work of railways." Whether the reforms come into force during Mr. Rowland's tenure of office or not remains to be seen, but there can be little doubt that, whatever happens, the duties of the head of the railway executive in Burma will, before long, become far more complex and onerous.

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### Long-Distance American Accelerations

During the year 1934 the acceleration of American passenger services was not confined to highly competitive inter-city services, such as those operating between Chicago, Milwaukee, St. Paul, and Minneapolis, to which we have referred in recent issues. Substantial cuts were also made in the times between Chicago and the Pacific coast. The Atchison, Topeka & Santa Fé RR. accelerated its fastest train from Chicago to Los Angeles—a route roughly 2,300 miles in length, cutting its way through the Rocky Mountains—from 56½ to 53¼ hr., while the best eastbound time was reduced to 55 hr. Similarly the time of the Golden State Limited of the Chicago, Rock Island & Pacific and Southern Pacific lines came down from 61¼ to 58¾ hr., and other services have been reduced in time by as much as 3 hr., between Chicago and Los Angeles. Between San Francisco and Portland the Southern Pacific put on new trains in each direction, both taking slightly under 20 hr., which is 1½ hr. less than the fastest timing previously in force. As we have previously noted, the schedules of a number of the New York-Chicago services, by both the Pennsylvania and New York Central Lines, have been reduced, in some cases by as much as an hour, so that 20-hr. runs, once the exclusive property of the Broadway and Twentieth Century Limited expresses, are now tolerably common. To and from the Southern States the Illinois Central RR. has restored the Panama Limited,

between Chicago and New Orleans; the Seaboard Air Line has placed its renovated Cotton States Special in service between New York and Atlanta, on a faster timing; and the new Florida Arrow of the Pennsylvania RR. is now running between Chicago and Florida.

\* \* \* \*

#### American Railway Purchases in 1934

With operating income in 1934 falling from \$71,000,000 above that for the first half of 1933 to \$100,000,000 below the figure for the second half of that year, the American railways have been unable to maintain the rate of purchasing which characterised the first half of 1934. A note in our issue of November 23 last drew attention to the decline in the value of material purchased which began to be apparent after June, and approximate figures for the whole year now published in the *Railway Age* show that although the expenditure on supplies, exclusive of new material, of \$625,000,000 was \$160,000,000 ahead of 1933 and the highest for three years, the slump after June was the most severe experienced since 1932. The final expenditure was some \$75,000,000 below what would otherwise have been recorded. As an example of the rate of the decline, rail purchases fell from a peak value of \$7,200,000 in April to \$560,000 in October. The total expenditure on fuel, materials and supplies increased from \$45,600,000 in January to \$64,750,000 in June, but later declined steadily to \$45,850,000 in October and an estimated \$38,500,000 in November. Excluding fuel, the figures aggregated approximately \$225,000,000 by June, but the succeeding slump in receipts limited them to a value of about \$185,000,000 in the next half year.

\* \* \* \*

#### The Study of the Steel Rail

Of all the purchases of stores made annually by railway companies, it is probable that the largest individual item in all cases is that of steel rails. Vast sums in the aggregate have been expended on this essential constituent of railway track, and it is not surprising, therefore, that from time to time railway engineers should get together with a view to discussing the many questions bearing on the cost, properties, wearing capacity, and defects of the rail. Triennially an International Rail Congress is now held in Europe for this purpose; the last meeting was at Zurich in 1932, and this year's congress is to be held at Budapest in September next. The detailed review which we published in the August, 1933, issue of *The Railway Engineer*, showed that the papers and discussions reached a high level of interest, and there is no reason to doubt that this year's proceedings will be of equal importance to all rail-users. These proceedings are summarised in book form, and the publication, written in French, German, and English, forms a treatise of considerable value on current rail problems. A special feature of the congress, as mentioned in the details that we give on page 413, will be an exhibition of welded rails up to 300 metres in length. So far as we are aware, no British railway or steelmaker has participated in the previous International Rail Congresses, but we trust that it may be possible to remedy this deficiency this year.

\* \* \* \*

#### Improving Locomotive Steam Generation

In an article on high speed locomotives in Germany published in this issue, there is the suggestion that, to keep down the weight-power ratio, certain novel features might be incorporated in steam locomotives, the boiler being the subject of one suggestion. It has long been known that, given very high gas and water velocities in a boiler, the effectiveness of heating surfaces could be

so greatly increased that a boiler much below the average in size and weight could be successfully used for any given rate of evaporation. It is the operation of this principle, more particularly on the gas side, which makes the locomotive type of boiler so much more prolific of steam than a stationary type boiler of the same weight. In this direction the water tube boiler is probably the ideal at which to aim, but the difficulty with this type of boiler is to control the movement of the hot gases so that they shall flow with even swiftness and in equal quantities over every square inch of heating surface. The Swiss firm of Brown-Boveri has been working on this problem of gaseous and water flow control for some years and has evolved the Velox boiler, which shows promise of approaching near to the ideal.

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#### The Velox Boiler

It has been suggested that the Velox boiler, mentioned in the foregoing note, should be fitted to the steam locomotive specially designed for very high speed work. In this boiler the velocity of the gases is comparable with that of sound, while the water circulation also is extremely rapid. The latter takes place in tubes, and the interstices between these are formed into streamlined channels so that hot gases which enter them under pressure rapidly acquire a high velocity in the way that steam does in the nozzles of an impulse turbine. The eddying losses are small, and, after the gases are cooled, their kinetic energy is reconverted into pressure energy in suitable channels through the superheater. The initial air pressure is provided by a turbo-blower identical with the super-charger of an internal combustion engine. Owing to combustion having taken place in the interim, the pressure energy of the gases leaving the superheater is greater than the pressure energy of the air to the combustion chamber, and hence it is possible to rotate the supercharger by means of a turbine letting down the pressure of the exhaust gases on their way via the feed heater to the chimney. The name Velox is derived from the fact that the gas velocity, water velocity, steaming rate, accommodation to load, and initial warming-up are all very rapid. The overall efficiency of the Velox boiler is said to be about 90 per cent.

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#### Running Shed Maintenance

The latest issue of the *Journal of the Institution of Locomotive Engineers* reports a discussion which took place at a meeting of the South American Centre at Buenos Aires on Mr. H. P. Renwick's paper entitled "Some Observations on Locomotive Design in its Relation to Running Shed Maintenance." In the course of the discussion, Mr. H. B. Davies, of the Buenos Ayres Great Southern Railway, said that his system has a local service dealing with some 300,000 miles monthly, at an average of 5,000 miles an engine. The engines are in actual service 20 hours daily and are worked by two or three crews. Needless to say this general pooling and extensive utilisation of engines requires very careful supervision and attention to running repairs. Figures laid down as a basis are 81.48 man-hours to 1,000 engine-miles for the maintenance of passenger engines, and 139.40 man-hours to 1,000 engine-miles for freight locomotives. Mr. Davies stated that his round figure for the home section, comprising 545,000 engine-miles divided into 375,000 local service and express passenger and 170,000 freight and heavy shunting miles, is 65 man-hours to 1,000 engine-miles. Every local service engine is tested thoroughly each week by an expert, who decides on the necessary repairs, whilst the same is done at regular intervals with express and freight engines.



### An Important Licensing Appeal

AN unusual case, which may have important reactions on the work of the Traffic Commissioners arising from the hearing of applications for limited carriers' or "B" road licences, is to be the subject of an appeal to the House of Lords by the Great Western Railway. The facts are that Hill & Long Limited applied to the West Midland Licensing Authority for a "B" licence for two vehicles to carry goods in districts round Birmingham and Wolverhampton, but the licensing authority granted the company a licence to carry furniture and certain goods any distance. The Great Western Railway, who did not lodge an objection to the issue of this licence because of the restricted locality in which the vehicles were to operate, as set out in the commissioner's official publication *Applications and Decisions*, felt it had been misled and accordingly applied to, and succeeded in obtaining a rule nisi from a King's Bench Divisional Court which called upon the licensing authority concerned to show cause why the licence granted should not be quashed. In December a King's Bench Divisional Court made absolute the rule nisi, with costs, and quashed the decision of the licensing authority as having been made in excess of its jurisdiction in that it had no power to vary the extent of the application as advertised without giving notice and opportunity for persons to object. The West Midland Licensing Authority then took the case to the Court of Appeal, which reversed the decision of the Divisional Court and allowed the appeal with costs. Having regard, however, to the importance to the railway companies generally of the principle involved, the Great Western Railway has now decided to appeal to the House of Lords.

It should be borne in mind that a "B" or limited carrier's licence is intended to cover those vehicles used to convey the haulier's own goods as well as goods for hire or reward. This class of licence is held by such people as coal merchants, furniture dealers, and small shopkeepers who employ a vehicle or vehicles for their own business and also perform a certain amount of general haulage work. One of the grounds upon which an objection may be lodged to the issue of such a licence is that suitable transport facilities exist in the district or between the places which the applicant proposes to serve. On the basis of the Court of Appeal's decision, it would appear that although an applicant may ask for a "B" licence and state, in accordance with Section 5 of the Road and Rail Traffic Act, 1933, that his vehicle will "normally" be used in, say, Warwickshire, the commissioners may grant the licence with a much wider sphere of action. Moreover, an applicant, although applying to use the vehicles in a comparatively restricted area "normally," might, in fact, be intending to carry goods very much further afield should opportunity occur. Should this position be upheld, the railway companies and other competitive road hauliers might find it necessary to protect their position by objecting to every application for a "B" licence with the view of trying to secure that its sphere of action is strictly limited. Such a procedure is, however, to be deprecated from the point of view of the additional work it will place on the licensing authorities.

Meanwhile, it is interesting to find that early last month, Sir Henry Piggott, the licensing authority for the South-Eastern Area, is reported as having stated that, in the early stages of the work under the Road and Rail Traffic Act, 1933, it would be unfair to tie an applicant to the terms of his application when he had applied wrongly owing to lack of knowledge. At the same time he felt that it would clearly be unfair to grant a licence in wider terms than those contained in the application and, therefore, if he considered that a wider sphere of operation

than applied for was necessary, he proposed to re-advertise the application in *Applications and Decisions*. Apart from the legal considerations involved, it seems probable that this procedure would prove generally acceptable.

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### London & North Eastern Railway

A CONVENIENT summary of the year's working is again included with the full report and account for the year 1934, and this sets out clearly the railway traffic increases which are recorded in all branches of the company's business. At £44,538,000 the total is 5.25 per cent. over 1933, although 19.14 per cent. below 1929. Passenger receipts show the smallest increase as the total of £16,161,000 is but 2.47 per cent. above 1933, and it is the percentage increases of 6.91 on merchandise and live stock, and 6.88 on coal and coke which account mainly for the improved results. The revival in the country's trade which began towards the end of July, 1933, continued and developed throughout 1934, and this is illustrated by a 9.02 per cent. increase (some 10,279,000 tons) in freight traffic carried during the year under review. The accompanying table compares results for the past three years:—

	1934	1933	1932
Total expenditure on capital account ..	351,333,741	350,076,791	349,349,642
Gross receipts from businesses carried on by the company ..	51,376,256	48,789,274	48,678,700
Revenue expenditure on ditto ..	43,521,169	41,496,163	41,979,163
Net receipts of ditto ..	7,855,087	7,293,111	6,699,537
"J" Joint Lines—company's proportion of net revenue ..	258,199	242,401	182,468
Miscellaneous receipts (net) ..	1,177,889	1,120,950	1,212,934
Miscellaneous charges ..	943,029	933,342	928,081
Net revenue ..	8,348,146	7,723,120	7,166,858
Interest on loans and debenture stocks, &c. ..	4,253,298	4,255,105	4,255,105
Dividends on guaranteed and preference stocks ..	4,158,458	3,492,949	2,960,543
Balance after payment of preference dividends ..	Dr. 63,610	Dr. 24,934	Dr. 48,790
Deficit ..	63,610	24,934	48,790
Appropriation from reserve ..	50,000	50,000	50,000
Balance brought forward from previous year ..	56,643	31,577	30,367
Balance carried forward to subsequent year ..	43,033	56,643	31,577

Expenditure on capital account for the year amounted to £1,256,950. Good progress has been made with the various schemes undertaken as the result of the remission of passenger duty and most of the works have been completed and brought into use; the total amount expended in this connection to December 31 last is £1,353,669. Work on schemes under the Development (Loan Guarantees and Grants) Act, 1929, was completed with the formal opening of the Parkeston Quay extension on October 1 last, and the total expenditure was thus brought to £2,671,526. Apart from such special schemes, new works amounting to £1,450,000 are in hand, and their completion will secure substantially improved efficiency. As was foreshadowed last year, revenue has been debited with increased expenditure on rolling stock, a step justified by increasing trade in contrast with the previous necessary policy of reducing as far as possible rolling stock expenditure during a period of decreasing passenger receipts. The rolling stock renewal fund has now received £2,000,000 from the way and works renewal—previously the largest of such funds. Since the formation of the L.N.E.R. 59 new trains, of which 51 are of articulated stock, have been provided for the Great Eastern suburban services, and the carriage building programme for 1935 provided for



12 more, and thus completely equipped these services with bogie stock. It is emphasised that expenditure other than for normal maintenance is sanctioned by the directors only to secure working economy or to increase revenue. In twelve years such schemes have yielded a return of 26 per cent. on their cost, and, while the more obvious works were, of course, taken in hand first, those reported upon during the past two years have shown a return of nearly 17 per cent.

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### Great Northern Railway (Ireland)

RESULTS for the year 1934 were naturally better than those for 1933, which was the worst year in the history of the company. The direct cost to the company of the strike, which lasted for ten weeks in the early part of 1933, was estimated at not less than £100,000, and the loss of traffic due to fiscal restrictions affecting cross-border business was believed to be over £150,000. These restrictions continued during 1934, as also the competition of unrestricted and uneconomic road services in Northern Ireland, which it is to be hoped will be checked by general legislation promised for this Session. Legislation enacted by the Free State in 1933 has largely succeeded in its object of reducing the uneconomic road passenger competition in the area served by the company, and steps are now being taken to acquire the licences of a number of road lorry undertakings with a view to further co-ordination of road and rail services and the elimination of wasteful duplication. The total net income in 1934 was not sufficient to permit of the payment of any dividends on the preference and ordinary stocks, which have not received anything since 1931. Payment of the dividend on the guaranteed stock is made possible by appropriating the remainder of the compensation under the Settlement of Claims Act and certain balances from miscellaneous accounts now released. The accompanying table compares the general financial position for the past three years:—

	1934	1933	1932
Total expenditure on capital account .. .. .	10,052,929	10,052,929	10,052,929
Gross receipts from businesses ..	1,247,912	1,003,534	1,389,912
Revenue expenditure on businesses .. .. .	1,207,188	1,075,469	1,360,954
Net receipts of businesses ..	40,724	Dr. 71,935	28,958
Proportion of compensation under Irish Railways (Settlement of Claims) Act, 1921 .. .. .	7,500	—	38,429
Miscellaneous receipts (net) ..	35,558	37,251	64,629
Total net income .. .. .	83,782	Dr. 34,684	132,016
Interest, rentals and other fixed charges .. .. .	114,465	115,863	113,186
Dividend on guaranteed stock ..	34,771	34,771	34,771
Balance .. .. .	Dr. 65,454	Dr. 185,318	Dr. 15,941
Appropriation from general reserve .. .. .	—	100,000	—
Balances released from miscellaneous accounts .. .. .	65,454	46,982	—
Brought forward .. .. .	—	38,336	54,277
Carried forward .. .. .	—	—	38,336

Passenger train traffic brought in £520,630, an increase of £111,594, and goods train receipts were £81,965 higher at £453,958. Passenger receipts were £396,682, against £304,239, and an improvement was shown in all three classes. Parcels, &c., and mails (£123,948) brought in £19,151 more. The net loss on road transport was reduced from £27,828 to £8,317, the gross receipts from road passenger services having advanced from £148,329 to £180,670, and the net receipts of the hotels department improved from £1,719 to £2,680. Smaller commitments in respect of "J" Joint Lines were mainly responsible for the reduction under interest, rentals, &c. Total railway receipts amounted to £1,011,860.

### Great Southern Railways

OF special interest in the report of the Great Southern Railways for the year 1934 is the appearance in the accounts for the first time of the working results from road transport services. In the accounts of former years net receipts from road transport have been shown, but they represented merely the balance of payments under working agreements, and afford no real basis of comparison. In 1933 these net receipts amounted to £15,004 and in 1932 to £2,799. The company has clearly benefited from the Road Transport Act of 1933, the general effect of which is to grant a controlled monopoly outside certain specified areas round ports, &c., to the Great Southern Railways, the Great Northern Railway (so far as the Free State is concerned), and the Dublin United Tramways. This monopoly applies to both passenger and goods services, which all require licences, and the three companies have been enabled, with the consent of the Minister of Industry and Commerce, to obtain transfers of licences previously granted to other undertakers. Gross receipts of the Great Southern company from road transport in 1934 amounted to £704,778, of which £499,679 came from passenger services and hire of passenger vehicles and £197,660 from goods services. Expenditure on road transport, including £67,494 transferred to renewal account, amounted to £624,384, leaving net receipts of £80,394. It is recorded in the report that the road concerns of the Irish Omnibus Co. Ltd. and John Wallis & Sons Ltd., which had been controlled by the Great Southern Railways Company, were merged in the company as from January 1, 1934. In pursuance of the powers granted by the legislation of 1933 the company is acquiring road transport concerns operating in the area served by its railway system. During 1934 a number of such undertakings was acquired and negotiations are in progress for further purchases of competing road concerns. Capital expenditure during 1934 included £240,964 on road vehicles (of which £121,754 was for vehicles taken over) and £40,713 for payments on account of acquisition of road transport undertakings. The company appears now to own 235 road motors for goods and parcels, 392 horse wagons and carts, and 263 omnibuses. The accompanying table compares results for the past three years:—

	1934	1933	1932
Total expenditure on capital account .. .. .	30,162,688	29,719,403	29,738,997
Gross receipts from businesses ..	3,857,559	3,600,217	3,172,461
Revenue expenditure on ditto ..	3,457,544	2,678,344	2,767,708
Net receipts of ditto .. .. .	400,015	321,873	404,753
Miscellaneous receipts .. .. .	106,847	113,848	115,952
Total net income .. .. .	506,862	435,721	520,705
Interest, rentals and other fixed charges .. .. .	358,770	434,508	477,859
Dividend on guaranteed preference stock .. .. .	155,415	Nil	Nil
Balance after payment of guaranteed preference dividend .. .. .	Dr. 7,323	—	—
Surplus or deficit (+ or -) ..	7,323	+ 1,213	+ 42,846
Brought forward .. .. .	46,208	44,995	2,149
Carried forward .. .. .	38,885	46,208	44,995

Railway gross receipts amounted in 1934 to £3,033,166, an increase of £161,254, and the railway expenditure of £2,719,845 showed an advance of £153,250, so that railway net receipts, at £313,320, were higher by £8,004. Net receipts from ancillary businesses (apart from road transport) were £6,301, against £1,553 in 1933. In the hotels department the profits improved from £6,609 to £7,891, and on docks, harbours, and wharves there was a profit of £2,437, against a loss of £1,139. Receipts from railway passengers were £819,743, an increase of

£24,750, but in mails, parcels, &c., there was a drop from £430,175 to £428,215. In the goods train receipts of £1,763,219 there was a net improvement of £137,797 in spite of a fall of £24,745 in livestock receipts.

The amount charged to maintenance and renewal of way and works was about the same as in 1933, but the charge to rolling stock was £70,279 heavier, and locomotive running and traffic expenses together increased by £43,115, with an increase from 11,275,300 to 11,864,545 in total engine mileage. The operating ratio was reduced from 90.65 per cent. to 89.97 per cent. Route-mileage open for traffic was 2,158½ against 2,169. The dividend on the 4 per cent. guaranteed preference stock is cumulative, and arrears have been accumulating thereon since January 1, 1932. The directors now recommend that the portion of the arrears of dividends for the year ended December 31, 1932, be paid. The arrears for this period are payable at the rate of 4 per cent. per annum on the amount of stock as it stood prior to its reduction by 50 per cent. on July 1, 1933, pursuant to Section 3 of the Railways Act, 1933, and consequently their payment will absorb £155,415.

\* \* \* \*

### Occupation Level Crossings

**A**FTER the fatal derailment of an express passenger train on November 27 last at Wormley, L.N.E.R., as a result of a collision with a road motor vehicle, we pointed out in our issue of November 30 the difference between a public road level crossing and an occupation level crossing. The former is safeguarded by all sorts of Parliamentary and Governmental restrictions which make the railways responsible for their user. Occupation crossings—or accommodation crossings as they are termed in the Railways' Clauses Act, 1845—are provided for the accommodation of those landowners whose property has been intersected by the construction of the railway. The owner, presumably, was compensated for the separation of the two parts of his property by the railway, and the provision of the crossing ended the railway company's responsibility. The company provided padlocks to the gates and gave the key to the owner or the tenant of the property concerned. With the growth of population and the increased number of houses, many occupation crossings have become quite busy thoroughfares. Some six weeks prior to the Wormley accident there was a similar collision at Barkfield Lane occupation crossing between Formby and Freshfield on the Liverpool-Southport line, L.M.S.R. Both these accidents were inquired into by Colonel Trench and his reports thereon have their main facts summarised on page 412 of this issue.

As illustrative of the greater use of occupation crossings, it may be noted that Barkfield Lane is, as will be seen from our sketch accompanying the summary of the report, one of three occupation crossings between the stations named. In 1925 the L.M.S.R. found that only one person had authority to use the crossing for vehicular purposes, so the gates were padlocked and a key given to the farmer concerned. This action, however, led to protests from neighbouring residents and from the owner of an estate between the railway and the sea, 1¼ miles away, so the padlocks were removed, pending further discussion. Colonel Trench's report observes that this crossing has a small vehicular user; yet we notice that on a typical day 25 vehicles used it. At Wicks Lane there is the larger user of about 48 vehicles daily. On the other hand—and we quote this as illustrative of how some such crossings could be closed, except, perhaps, for pedestrians—College Path is only 125 yards from the public road level crossing

at Freshfield station, and, as vehicular traffic is only trifling, it might very well be closed against road traffic. The occupation level crossing at Wormley is provided for Wharf Road, which runs from the village of Wormley on the west side of the railway to some market gardens and the River Lea on the east. Some 15 to 30 vehicles cross daily from and to the market gardens and on Sundays there is a certain number of private cars proceeding to and from the river. In fact, throughout the three miles between Broxbourne and Cheshunt, conditions in this respect are difficult, as there is a narrow strip of land between the river and the railway, with no north to south roadway and no outside communication except by level crossing over the railway. In that length there are eight occupation crossings, of which four have a substantial user.

Colonel Trench opens his remarks in the Wormley accident report—which, being the more recent and the more serious in its consequences, is of greater importance than the Formby-Freshfield—by observing that the occurrence from time to time of a serious accident, such as this, at a level crossing, tends to give rise to criticism, misunderstanding and possibly exaggeration of the dangers involved. Figures obtained by the railway companies show that there are 4,567 public road level crossings in this country, of which the great majority—4,368—are provided with gates and controlled by railway staff; the remaining few, mainly on railways and roads of minor importance, are provided with cattle guards but without gates, and are unattended. The Ministry of Transport has no information as to the number of occupation crossings but Colonel Trench thinks there are 10,000 or more. Incidentally, he concludes his report by recommending that the railway companies should collect data as to the total number of occupation crossings, and classify them according to their original and present purpose and their present user. The wide variation in intensity of road traffic prevents any useful statistical comparison of the incidence of accidents at the two types—public road and occupation—of crossing. It is, however, obvious that the standard of intelligence and care required to negotiate safely the average occupation crossing is higher than that required at the great majority of public road crossings, where the driver has only to come to a stand when he finds the gates closed across the road, and has every justification for expecting a safe passage when they are opened. When considering the use of occupation crossings, therefore, the mentality of the driver of the road vehicle must be remembered.

Coming now to a consideration of what should be done to avoid similar accidents it must, we submit, be remembered that whilst the railway companies may not be responsible for the user of occupation crossings, they are responsible for the safety of the passengers in their trains. The Wormley report records that legally a company would be able to object to the user of a crossing on a scale heavier than that which existed when the crossing was originally constructed, and that actions on those lines were contested successfully in the Courts in 1902 and 1909. In two cases on the L.N.E.R., the company, becoming aware of the prospect of a largely increased user of certain occupation crossings, has been able to prevent this by threat of an injunction. Here we would interpolate the query: could this increased user of an occupation crossing, without objection by the railway company, be held to be a condition accepted by the railway? It is important, regarding the acceptance of responsibility, to note that at Wicks Lane in the Formby-Freshfield case, after an accident there in 1932, the railway company, as a result of representation, prepared a scheme of warning bells, but as this would have cost the Formby Urban District Council £500 to instal and £36 a year to maintain, that authority decided that



the arrangement was not worth the expense. That, it seems to us, implied that the railway took no specific responsibility for the user of the crossing. Has the L.N.E.R. company, by its notice warning motor drivers to ask the signalman before crossing if it is safe, equally disclaimed its liability? It may be said that such a notice is of the same character as the usual trespass and "beware of the trains" notices, but what if the signalman says that it is safe and it is not? Now, moreover, Colonel Trench recommends in his Wormley report that, at that crossing, the gates be controlled from the signal-box and interlocked with the signals. For that he appears to have justification in that "the railway companies could not, and certainly do not, remain indifferent to the risks which may be involved to their passengers and staff by collision with road vehicles even if the cause may be entirely due to the negligence of the road vehicle driver." The concluding words of the report recommend that the companies should be asked "to consider, in the light of the report on both accidents, what practical measures are necessary for securing additional safety in future, and the means by which they shall be brought into effect, in the interests of safety, and with fairness to all concerned." There are other recommendations but they are of a comparatively minor character. What we are concerned with is the position referred to in the concluding words of the Forby-Freshfield report: "Where extensive building development has and is taking place, relying largely on the use of old occupation crossings for access, I suggest that, before approving such scheme, it should be the duty of the local authority concerned to satisfy itself that the development includes the provision of adequate, convenient and safe means of access, both vehicular and pedestrian. If this can be done it will at any rate put a check on the future creation of the more flagrant cases of unnecessary danger spots."

\* \* \* \*

### German High-Speed Locomotive Design

THERE is a tendency nowadays where steam locomotive practice is concerned, to regard the terms high speed and streamlining, not perhaps as being synonymous, but as something of an inseparable nature. In Germany, where the matter is receiving close attention at the present time and much experimentation is afoot, the evolution of locomotive types capable of speeds up to 100 m.p.h. or even more is being pursued with energy, and always with the idea that streamlining, in part or as a whole, must form a basic principle in developing the designs. This is perhaps natural for the reason that unusually high speeds obviously cannot be attained if the effects produced by air resistance are ignored. There are, however, other important factors to be taken into account and some conflicting problems to be reconciled, the size and number of the coupled wheels ranking in the forefront of the whole question. Commensurately with the investigations of the leading German locomotive building firms, involving tests with models in wind tunnels, and other measures aiming at the production of satisfactory high-speed steam locomotive designs, we find eminent locomotive experts, such as Dr. Wagner and Professor Nordmann, of the Reichsbahn, reading papers before gatherings of locomotive engineers and contributing articles to technical journals on this subject. We have devoted some space in the present issue to the reproduction, in abstract form, of these important contributions to the furtherance of the theoretical and practical sides of the subject.

Dr. Wagner, in addressing a meeting of the Institution of Locomotive Engineers in London last night, remarked that for speeds of 100 to 110 m.p.h., a driving wheel dia. of

7 ft. 6 in. seems adequate, and the number of such wheels must depend, as in ordinary practice, upon the loads to be hauled and the weight carried by individual axles. In the case of the German investigations the train load was set at 200-220 tons, representing a train of four heavy, or five light steel coaches, and the wheel load at 18 tons per driving axle, so as to make the locomotive usable on all main lines, even those not yet reconstructed for 20-ton axle loads. Figuring on this basis, two pairs of driving wheels would seem to be sufficient, but on the other hand, as is well known, when four coupled wheels are placed between leading and trailing carrying wheels there is a tendency to slip. On the subject of air resistance and streamlining, Dr. Wagner said that in designing a locomotive for 100 m.p.h. or more, air resistance demands serious consideration. This resistance can be overcome by employing more power, but the burden upon the coal budget can be eased by covering the entire locomotive and tender, so as to eliminate the influence of projecting parts, including the wheels, rods and brake components. It is impossible to streamline a locomotive, including the tender, completely, just as the correct streamlining of railcars is bound to be imperfect, but it is advisable to enquire closely into the merits and possibilities of covering up a locomotive, especially as a covering may interfere with the outlook of the engine crew, and consequently alter the entire layout of the locomotive. In carrying out these experiments a reasonable shape was found, but of course no one knew how the coverings would affect lubrication and the temperature of the rod and axle bearings. In order to elucidate this, one of the modern light Pacifics was covered in all round below the running board and had a parabolic smokebox hood fitted. A thorough series of train tests was carried out with the locomotive so arranged. The tests showed that the covering saved 190 h.p. at 78 m.p.h., as compared with an uncovered engine of the same type.

Professor Nordmann, in the paper which he read before the Deutschen Maschinentechnische Gesellschaft on New High-Speed Locomotives in Germany, said that the practicability of improving train schedules with existing locomotives was demonstrated by the trials of a 4-6-2, series O3, locomotive, hauling light express trains on the Hamburg line at speeds up to 140 km. (87 m.) p.h., although this machine was originally intended for not more than 120 km. (74.6 m.) p.h. Dynamometer car records with trains of from 200 to 240 tons showed an average rate of steaming about 20 per cent. below the usual full loading, namely, 57 kg. per sq. m., or 11.70 lb. per sq. ft. per hr., the highest recorded boiler loading being 51.7 kg. per sq. m., equal to 10.6 lb. per sq. ft. per hr. The highest speed attained during these trials was 144 km. (89.5 m.) p.h., but nearly 160 km. (99.4 m.) p.h. is said to have been reached with standard 4-6-2 locomotives. Dealing with the subject of air resistance, Professor Nordmann said the trials such as those mentioned have demonstrated that existing standard locomotives are mechanically capable of higher speeds, but the first step towards the improvement of schedules must consist in reducing air resistance by streamlining, thus leaving a margin of power available for the achievement of higher speeds. Reference to the article on pages 387 to 391 which includes, as well as the contribution of Professor Nordmann, observations made by Dr.-Ing. Litz on the same subject, and the illustrations accompanying it, will afford an opportunity of following in detail the nature and results of the research work carried out in Germany recently with the object of evolving suitable steam locomotive types capable of operating efficiently on very much faster schedule timings than those at present prevailing in the regular services.



## LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

### Northern Pacific 4-8-4 Engines

Spencer's Hotel,  
Madras, February 17

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have just seen your issue of January 25, and the description of the new Northern Pacific 4-8-4 locomotives. In reference to the diameter of the drivers, may I remind you that some few years back the Great Northern received from the Baldwin locomotive works a new class of express locomotives, also of the 4-8-4 type, having 6 ft. 8 in. drivers, and that some time ago now the American Locomotive Company built a few engines of the same type for express passenger service on the Delaware, Lackawanna & Western, having 6 ft. 5 in. driving wheels, equal to those of the new N.P. engines. When the D.L. & W. engines were built they had larger driving wheels than any other eight-coupled design, and held this distinctive feature until the Great Northern engines were built some years later. Both these locomotives have been illustrated in *The Railway Engineer*.

It may be interesting to recall that the 4-8-4 type was first used on the Northern Pacific, and for that reason has at times been called the "Northern Pacific" type. The first batch of these engines has been in service some years.

Yours faithfully,  
E. CECIL POULTNEY

### Express Train Punctuality on the L.N.E.R.

London, N.,  
February 25

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Interesting figures—not always of a highly satisfactory nature—have been indicated by correspondents from time to time regarding the proportion of punctuality or otherwise which they have recorded in the course of observations upon British main lines. Some time ago it was my privilege to draw your attention to the good working noted on several occasions upon the Great Northern section of the L.N.E.R., and I venture to return to the point in order to describe what I regarded as a commendably satisfactory showing on a recent consecutive Friday and Saturday, when some trains were carrying heavy complements of scholars returning to school and there was the usual week-end increment of average loading.

Taking all the principal up expresses coming from Peterborough or beyond which were due to arrive at King's Cross between 1.3 and 9.55 p.m. on each day, the records of Friday showed that of the fifteen chief trains thirteen were slightly before time, one was exactly punctual, and the last only—the heavy afternoon Scotsman due in at 9.55 p.m.—was four minutes late. Even this was due to the cautious running on the closing stages of the run from Newcastle (following some time recovery further north) as a bearing tended to become overheated. The Cromer and Grimsby express, due in at 4.20 p.m., which boasts a 60.3 m.p.h. booking up from Peterborough, passed Wood Green just after 4.9 p.m., hauled by an Atlantic with 245 tons, and so had covered over 71 miles from the start in about 65 min. The 580-ton express from the north, due King's Cross five minutes before at 4.15 p.m., was sufficiently early to allow the following light "flyer" a clear road. The Flying Scotsman, now due at 5.40 p.m., was two minutes early, although loaded to 550 tons in all.

On the following day, Saturday, the up West Riding Pullman was exactly punctual with an 8-car, 345-ton load; the Cromer and Grimsby fast train previously mentioned was the

only slightly belated express arrival in 10 hours (2½ minutes late, but apparently about 1½ minutes had been gained by the old 4-4-2 engine), while all others, including two special half-day excursions, were anything up to 4 minutes early. Eight loads were 400 tons or over, the maximum being 560 tons, with another only about 10-15 tons less on an estimated gross basis.

Some of the schedules are probably suitable for further acceleration, but to the vast majority of travellers a comfortable and punctual service undoubtedly gives considerable satisfaction, and this, though not exceptional in my twenty-five years' observation of traffic-working over these metals, was a highly satisfactory two-day week-end result.

Yours faithfully,  
R. A. H. WEIGHT

[We are glad to pass on these laurels in the expectation that there will be no resting on them.—Ed. R.G.]

### Mechanics of a Locomotive on Curved Track

Mechanical Engineering Department,  
The University, Edgbaston,  
Birmingham.

February 23

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—A reply to Mr. Dendy Marshall's criticism in your last issue of the paper on the curving of locomotives involves a detailed analysis of the forces acting on an engine. To simplify matters I will assume that the engine has horizontal cylinders, and I will also neglect the acceleration forces of moving parts, such as the connecting rod, &c.

The upward force of the crosshead on the slide bars is equalled by a downward force on the crank pin, and results in a transfer of weight from the position of the crosshead to the crank axle; as the slide bars are on the frame which is carried on springs, this alters the compression of all the springs and alters the effective weights on the wheels. These two equal forces acting at different points cause a couple which is equal to the driving torque on the crank axle, and is therefore equal to the tractive force multiplied by the radius of the driving wheels. Looked at in this way, the engine produces a tractive force at the level of the centre line of the cylinders, and has a backward tipping couple equal to the tractive force multiplied by the radius of the wheels.

There is, however, a probability that the level of the drawbar is not the same as that of the centre line of the cylinders, and if so there is a further couple to be considered equal to the tractive force multiplied by this difference in level. The sum of these two couples is of course equal to the tractive force multiplied by the height of the draw bar. This combined figure is taken into account by the author of the paper, and is referred to on page 232 of your issue of February 8 as a "rearing couple"; its effect on the springs is duly dealt with in a later paragraph. Apparently, Mr. Dendy Marshall did not grasp the neatness of combining the two couples in one, hence his perturbation.

The question of wind resistance is much too complicated to be taken into account in such a paper as the one under consideration; it would at least have doubled the length of the paper, and would have introduced a factor varying from minute to minute in an entirely incalculable way; side pressure would have had to be considered as well as frontal pressure, of course.

Yours truly,  
R. C. PORTER

## THE SCRAP HEAP

We have already quoted one view of railway travel expressed by a prominent Frenchman of the eighteen thirties—that of the astronomer Arago on the atmospheric dangers of tunnels. At the same period the publicist Louis Veuillot summed up his impressions of travel by train in the words: "The railway is the manifestation of an insolent contempt for the individual and his liberty . . . I am not a man, I am a parcel; I do not travel, I am despatched." The concluding sentiment is remarkable for the closeness with which it parallels that of Ruskin on the same subject in "Modern Painters," published a few years later.

A new idea in railway comfort adopted in Japan would add gaiety to our travel if it were adopted in this country. In every station blackboards are provided on which an inscription states: "Passengers desiring to communicate with friends expected later are invited to write messages." Here are some of the messages: "I waited half an hour, then took the 10.50 to Kyoto." "Can't go today; please don't be angry." "Have gone to restaurant, second floor." Trouble is suggested by the note: "My husband returned. Come next week."—From "The Evening Standard."

The system of dividing the contracts into small portions or sections, as is common in the construction of many of the Continental railways in rocky and mountainous regions, has also been adhered to on the Schwarzwald Railway, and found to answer most admirably; as, though the workmen belong to various nationalities, which gives them a most picturesque and cosmopolitan appearance, yet as they are divided into separate companies by the very nature of their work, they live together in peace and harmony, not the less, perhaps, from their being mostly unable to understand each other's vernacular. Thus the Italians

are used for their great skill in tunnelling, the Swiss in making the open cuttings, and the Germans are employed in making the permanent way. To listen to the jargon of all their different *patois*, and try and make out their meaning, is, of itself, a study for the philologist.—From "The Railway News" of March 2, 1872.

### LADY TRAVELLERS

The absurd length to which a maternal Government is prepared to go in its interference with railway management is illustrated by the recent exhibition of solicitude for the safety of the partners of our joys and sorrows, prospective or in fact, who form that portion of humanity which the sterner beings sometimes characterise as the weaker sex, but who in these days of women's rights spurn the soft impeachment and claim to be the superior beings.—From an editorial in "The Railway Times" of March 3, 1888, on the Board of Trade recommendation of compartments for ladies only.

### MORE U.S.A. RAILWAY NICKNAMES

In addition to the U.S.A. railway nicknames published in our issue of November 16, the following have now appeared in recent numbers of the *Railway Age*: Detroit & Mackinac—Defeated & Maltreated; Atlantic Coast Line—Atlantic Clothes Line; Bangor & Aroostock—Bang-up & Arrogant; Boston & Albany—Before and After; New Orleans & North Eastern—No Omelettes & No Eggs; Carolina, Clinchfield & Ohio—Corn, Cotton & Oats; West Virginia Central & Pittsburgh—Watch Very Carefully & Proceed; Colorado & Wyoming—Carpenter & Walrus; Hoosac Tunnel & Wilmington—Hoot, Toot & Whistle; Hoosac Tunnel & Wilmington—Hot, Tired & Weary; Live Oak, Perry & Gulf—Lean Over, Push & Grunt; Live Oak, Perry & Gulf—Live On Peas & Grits; Manchester, Dorset & Granville—Mud, Dirt

& Gravel; Green Bay & Western—Grab Baggage & Walk.

After so much that is either uncomplimentary or obscure, the nickname of the Baltimore & Ohio, known as the Best & Only, comes as a belated pat on the back.

### FARES BY HEIGHT, NOT AGE

Our correspondent in China sends us a paragraph from the *North-China Daily News*, with the remark that to charge children's fares according to height instead of age seems to suggest another use for the railway loading gauge. The paragraph reads:—

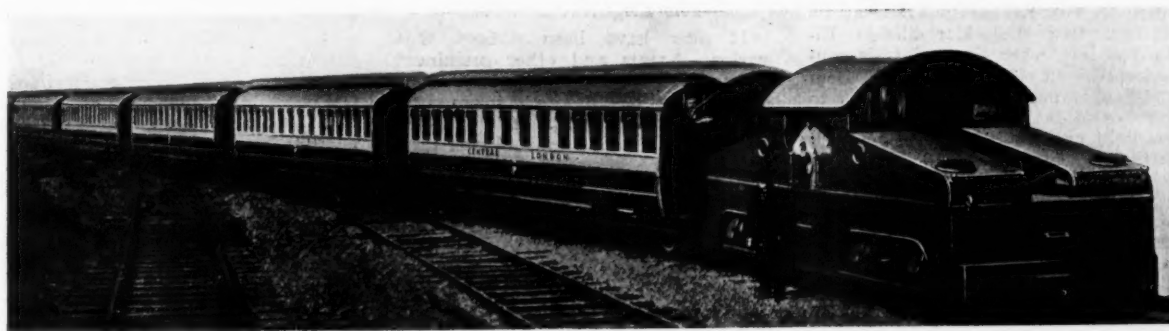
For the purpose of avoiding disputes between passengers and conductors and thus increasing the efficiency of railway management, new regulations governing fares for children have been drawn up by the Ministry of Railways.

According to the new regulations, children will be charged in accordance with their height, instead of their age, as hitherto has been the practice. Only those under 2 ft. 6 in. will have the privilege of travelling free, while those between 2 ft. 6 in. and 4 ft. 3 in. will pay half fares, and those above 4 ft. 3 in. will have to pay full fares.

These regulations, it is reported, shortly will be enforced by the Nanking-Shanghai Railway and, if found effective, will be applied to other railways.

### APPRECIATING RAILWAY BENEFITS

One hundred years ago, at a time when railway communication was viewed with deep suspicion in many agricultural districts, the *Exeter and Plymouth Gazette* recorded that a deputation from the directors of the G.W.R. (then awaiting their Act of incorporation) would attend a public meeting in the Guildhall, Exeter. "It is clear," this paper adds, "that this district will never enjoy the benefits of railway communication with the Metropolis except through the medium of the Great Western Railway. We feel bound, therefore, to advocate a measure fraught with consequences so important to this agricultural county. Railways are in project and in course of execution in many parts of the country, and our relative advantages will be lost unless we adopt this general improvement of modern times."



Electric locomotive and train of the Central London Railway as used when public traffic was inaugurated on July 30, 1900. The locomotives, built by the General Electric Company of Schenectady, U.S.A., weighed about 40 tons and were alleged to cause vibration to property above the tube. Multiple-unit motor coach trains were substituted in 1902.

## OVERSEAS RAILWAY AFFAIRS

*From our correspondents*

### EGYPT

#### Antiquities Trains between Cairo and Luxor

The running of the above trains, which proved so popular last season, recommenced on January 5. The inclusive fare charged this season is £E.2, a sum which includes a return railway ticket, food for two days (three meals a day), hire of a blanket and pillow, transport and entrance fees to the monuments. The first of these trains carried 303 passengers.

	£E., Mm.
Haulage expenses amounted to...	141.540
Food expenses amounted to ...	90.900
Blankets expenses amounted to	30.300
Transport charges at Luxor amounted to ...	60.600
Tax for visiting monuments amounted to ...	30.300
Total expenses ...	353.640
Receipts ...	604.600
Net profit ...	250.960

#### Helwan Line Electrification

The proposed electrification of the Helwan line is being further examined by an expert from Great Britain, who will advise the Government as to the kind of operating units he considers most suitable and other technical details connected with the project.

#### Washout on Cairo-Suez Direct Line

As a result of heavy rain on January 15, two washouts occurred on the Cairo-Suez direct line, one of which, between El-Owebid and Suez Junction, caused the banking engine that had banked a goods train up from Suez to El-Owebid to derail and capsize on its return journey after dusk. The driver and fireman received fatal injuries.

#### Serious Accident at Abu-Zaabal

A serious accident occurred at 4.16 p.m. on January 31 on the locomotive siding at Abu-Zaabal quarries, at its junction with the Marg-Shebin El-Kanater line, when the staff train conveying about 700 employés from Abu-Zaabal new locomotive works to Cairo came into violent collision with two light engines which were standing on the dead end of this siding. As a result of the impact two coaches on the staff train were telescoped, causing Mr. W. R. Ambler, Works Manager of Abu-Zaabal workshops, and five clerks to receive fatal injuries, and several other employés to be seriously hurt. The accident is attributed to the driver failing to bring his train to a stand at the junction points, which had not been set for the main line owing to "line clear" not having been obtained from the cabin in advance. He thus

infringed Rule 156 of the General Rule Book, which reads:—"No engine must enter upon, set back from, or cross, any running line without the permission of the person in charge of the points and signals, nor then until the proper signals have been exhibited."

#### Capital Budget Proposals, 1935-36

The principal items of expenditure in the 1935-36 budget proposals are as under:—

	Estimated Cost £E.	1935-36 Grant £E.	Amount required to com- plete work £E.
Extension of Mariut line to Mersa Matruh	260,000	50,000	209,589
Sidi-Gabir re- modelling and new station ...	50,000	25,000	25,000
Sidi-Ghazi-Bus- selli line ...	300,000	35,000	265,000
Completion of Tanta re- modelling ...	132,000	19,800	—
Remodelling of Gabbary yard between Sidi- Kerim and Cabin 3 ...	24,000	12,000	5,000
Housing scheme at Abu-Zaabal	150,000	50,000	100,000
Completion of Cairo-Suez direct line ...	188,000	5,300	—
Abu-Zaabal new locomotive workshops ...	176,737	12,088	—
Construction of various goods depots at Alexandria and remodel- ling Sidi-Gabir goods depot ...	19,057	13,000	—
New line from Samaana to San-El-Hagar	90,000	25,000	65,000
New bridge at Nag-Hamadi	213,000	30,000	183,000
New station and deviation at Nag-Hamadi	36,400	10,000	26,400

### INDIA

#### The Engineer in India

It may have been noticed that various Agents and other prominent railway engineers in India whose portraits and biographies have appeared in THE RAILWAY GAZETTE from time to time, have "M.I.E., India" after their names, which signifies that they are Members of the Institution of Engineers, India. This institution has been in existence for many years and has become increasingly important. A petition for the grant of a Royal Charter for the Institution has now been forwarded by the Government of India to the Secretary of State for submission to the Privy Council.

The total membership in August last was 1,245, and provincial centres are situated in Bengal, South India, and

the United Provinces. At these centres papers are read and lectures given upon various engineering subjects, both civil and mechanical. The institution acts as the Indian Committee of the British Standards Institution, and deals with an ever-increasing number of specifications.

#### Northern India

In the Punjab and North West Frontier Provinces the interchange of technical ideas is carried out through the medium of the Punjab Engineering Congress, which meets annually: it has just been in session. The session lasts about a week, and during this period visits are paid to important works, papers are read, and discussions follow upon subjects of interest to the various branches of the profession, namely railway (civil and mechanical) irrigation, roads, and buildings. Great trouble is taken in the preparation of papers and illustrative drawings and diagrams, which are usually printed and circulated to members. One of the papers which has been read during the present session deals with the replacement of a masonry viaduct constructed on steep hillside near Simla, by a steel trestle structure. [See page 885 in our issue of November 30.—ED. R.G.]

### FRENCH NORTH AFRICA

#### Sahara Railway Project Recommended

Plans for the construction of the long-proposed railway across the Sahara Desert to connect Northern Africa with the Valley of the Niger in the French Sudan were recently discussed by the French Imperial Economic Conference and subsequently recommended by it to the French Government for its approval and support. These plans form one of many projects intended to aid Colonial developments and at the same time stimulate French industry and commerce with a view to overcoming the trade depression and reducing unemployment. But, as the Trans-Saharan Railway would require a large financial outlay with only remote possibilities of any return on the capital expenditure, prospects that the Government will give practical effect to the recommendation are not very bright.

One of the arguments put forward in favour of the scheme at the present time is that Europe would be called upon to furnish railway equipment to the value of about fr. 1,600,000,000 (£20,000,000 at fr. 80 to the £) and that France would probably be able to undertake the whole supply. It is estimated that the manufacture of the equipment would give work to 35,000 men for four years. The survey engineers consider that the construction of the railway presents no difficulties and the cost of upkeep would be extremely small, as there are no hills, sand dunes, or rivers encountered and only three cuttings would be necessary.



There would be only a few intermediate stations, just sufficient to accommodate gangs of men required to maintain the permanent way in good condition. Railways in a waterless desert need little attention, and it is stated one man for four miles would be sufficient.

#### The Alignment, Cost and Gradients

The line would run from Oran or Nemours on the Mediterranean to Niamey or Segou on the Niger, and its length would be about 1,875 miles, about 1,250 miles being in the Sahara proper. The cost is estimated at £13,200 a mile for a standard gauge line with standard rails weighing 46 kg. per m. and steel sleepers. The total cost, including interest on loans during a construction period of eight years is put at £37,500,000. A line is already in existence as far as Bou Arfa, not far north of Colomb Bechar.\* From Bou Arfa to Niamey on the Niger the gradients would never exceed 1 in 200 and from Bou Arfa to the Mediterranean, a distance of 220 miles, the ruling gradient would be 1 in 125. A branch line is also proposed to connect the main line with Touggourt in Algeria.

#### Suggested Operating Methods

A few fast railcars would be sufficient to cope with the small amount of passenger traffic at the outset, but heavy goods trains would be necessary. The original estimates provided for trains of 1,500 tons hauled by powerful diesel locomotives, but recent progress indicates that trains of 3,000 tons could be run. They would not be run at regular intervals, but would be made up as demands for traffic accumulated, and probably two trains a week would suffice. The cost of transport with trains of 1,500 tons from the Niger to the Mediterranean is put at 150 fr. a ton, but with trains of 3,000 tons it could be cut down to 90 fr. a ton. The actual freight charges to the public would, however, be considerably higher to cover fixed charges and allow for profit.

#### Road Vehicles as an Alternative or Subsidiary

As to the alternative of road vehicle transport, if it were merely a question of transporting a few hundred tourists across the Sahara, nothing more than motorcars with caterpillar wheels would be needed, but the cost of goods transport by trucks would be prohibitive. A motor road would, in fact, be necessary, and this would be more costly in construction and upkeep than a railway. The motor truck could not possibly compete with long-distance goods transport by railway, but, on the other hand, lorries would be useful as feeders to the railway within a radius of 300 miles of each station.

It is estimated that the Trans-Saharan Railway would have to transport at

least 300,000 tons a year to make it a profitable enterprise, and that it would perhaps take 25 years to attain that figure. But within 60 years, it is believed the traffic might amount to 600,000 tons in one direction and 400,000 tons in the other. On this supposition, the railway should meet all its charges and redeem its capital outlay within a concession period of 60 years. It might then revert to the State free of all debt.

## IRELAND

### Staff Repercussions of Road Transport Absorption

The fusion of road transport with railway interests is creating difficulties with regard to wages in some parts of the country. In the Dundalk area, the National Union of Vehicle Builders served a strike notice upon the G.N.R. as the demand for Dublin rates of wages had not been acceded to by the company. Meetings have also been held between representatives of the G.S.R. and a number of the more influential unions, to discuss the position of road transport staff among the railway shopmen.

### County Down Wages Cut

Sitting in Dublin on February 18, the Irish Railway Wages Board considered the application of the Belfast & County Down Railway for the continuance of the 10 per cent. wages cut imposed in 1927 and since—with one exception—allowed annually. After hearing Mr. Minnis, the General Manager, and scrutinising the accounts of the railway and subsequently hearing the views of the three railway unions, the Board was unanimously of opinion that the 10 per cent. reduction should continue until further order of the Board, in any event to be reconsidered prior to March 1, 1936. The Board was composed of:—The Hon. Mr. Justice Wylie (Chairman), six representatives of the railways, four representatives of the railway users and six of the unions, as well as the Secretary, Mr. John T. Drennan.

## SWITZERLAND

### Federal Railway Loans

The following two railway loans will mature in the near future:—

(a) The 5 per cent. loan of 50 million Swiss francs placed in Holland in 1925, maturing on March 15, 1935.

(b) The 5 per cent. electrification loan of 150 million Swiss francs, placed in Switzerland in 1925, maturing on April 15, 1935.

In order to meet these obligations the Swiss Government has decided to issue 3½ per cent. Treasury bonds at 6 years at 98, to the amount of 100 million francs, and to enter into negotiations with Swiss banks for the issue of a 3½ per cent. conversion loan of 100 million francs at 20 years on account of the Federal Railways. The medium term Treasury Bonds to be issued on behalf

of the Federal Railways will not be offered for public subscription, as the total issue of 100 million francs has already been under-written by a number of Swiss banks which will place these bonds privately.

With the introduction of Treasury Bonds at 3½ per cent. and the issue of a conversion loan at a similar rate, the Swiss Government appears to be giving a lead towards the introduction of measures tending to reduce the interest rates in Switzerland in accordance with the programme of price readjustments recently advocated by leading Swiss politicians. These operations are expected to bring in a saving of from 2½ to 3 million francs yearly on the interest charges of the Federal Railways. According to the Swiss press, out of the 50 millions placed in Holland ten years ago, the greater part is now again in Swiss hands.

## GERMANY

### Berlin-Rhineland "Flying" Services

The new railcar service between Berlin and Cologne, which will be worked with cars of the Flying Hamburger type and to very similar schedules, is to be inaugurated on May 15 next. The State Railway also announces that the Lufthansa Company is inaugurating a new regular air service between Berlin and the Rhineland. Passenger planes will ply between Düsseldorf and Berlin twice daily in each direction.

### Well-known Signalling Firm

The death—referred to in our Personal columns this week—of Dr. Carl Bachmann, the doyen of the German signalling industry, is a reminder of the development of the firm of Scheidt and Bachmann, of which he was the founder. The business was established in 1872 and the works were situated at München-Gladbach until removed to Rheindt in 1914. The firm, for the first eighteen years of its existence, held the rights, in the Cologne and Elberfeld districts, for the manufactures of the older concern, Schnabel and Henning of Bruchsal. The arrangement was dissolved in the 'nineties and Scheidt and Bachmann then developed their own designs. Their mechanical signalling apparatus was eventually seen a good deal in Western Germany and enjoyed an excellent reputation for efficiency: it was also used in Spain. Rights for low pressure pneumatic signalling were acquired by the firm, and, with certain modifications to meet German requirements, was put in by it at several stations, among them Düsseldorf and Stendal. The firm has also recently produced its own all-electric system. The activities of the concern are, however, not limited to signalling, for gauges and measuring apparatus for diesel cars and road lorries are now made at Rheindt.

\* See map on page 829 of our *Electric Railway Traction Supplement*, dated November 16, 1934.

## IMPRESSIONS OF OVERSEAS TRANSPORT

### *XIII—Road competition with the New Zealand railways comes from small independent operators with whom it is difficult to effect co-ordinative arrangements*

By A. W. ARTHURTON, formerly Secretary, British Railways Press Bureau

ON my visit to New Zealand, it was my good fortune to bear a letter of introduction to Mr. H. H. Sterling, Chairman of the Railways Board, and I thus found the way considerably smoother for my investigation of transport conditions in the country. An hour or so spent in his company left me with the impression of a dynamic personality which, added to intense application, practical knowledge, and vivid imagination, has enabled the New Zealand Government Railways to survive the depression and brought them to comparative prosperity. As I afterwards found in touring the country, he has been instrumental in evolving an efficient and progressive railway system which must be of inestimable benefit to the Dominion and its people.

New Zealand railways, like those of every other country, have had to face in recent years the problem of road competition. I was curious to know why state-owned railways should be suffering from the competition of road carriers seeing that the Government owns and controls both railways and roads. This, I gathered, was in a great measure due to political considerations affecting transport problems which state-owned concerns never seem to be able to avoid. Cases, I learnt, have not been unknown in which political influence and interference have led to action inimical to the interests of the railways, and, incidentally, to the pockets of the taxpayers, since losses on state railways, due to diversion of traffic to the roads have inevitably to be met by the general public.

The provisions of the Transport Licensing Act, 1931, of New Zealand are somewhat similar to those obtaining in Great Britain. Public hearings are held by the licensing authorities at which applications for the granting or renewal of licences are heard. The railways, as in Great Britain, are represented at such hearings, but frequently find it necessary to appeal against decisions of the licensing authorities because the Railways Board thinks that these are opposed to the best road transport interests of the Dominion. The board believes that the Railways Department is capable of affording a satisfactory road service if required, thus bringing about co-ordination between road services and the railways, which will be more effective and be achieved with less friction than could be the case with outside road services.

#### **Railway Attitude to Road Competitors**

The board is opposed to the running of long distance goods services by road in wasteful competition with the railways. As in Great Britain, the railways are faced with intensive competition for the higher classes of merchandise traffic throughout the Dominion. This competition has seriously depleted railway revenues and unless the position is settled through the operation of the Transport Licensing Act, the board fears that it will be compelled to consider making some drastic revision in the rates in districts most seriously affected. It is, of course, bound to accept the decisions of the licensing authorities, but if road motor services are authorised in competition with the railways in districts where little traffic originates, the board intimates that in such circumstances it might be compelled to take action.

The policy of the board has been directed towards improving the financial position of branch lines in the hope of justifying their continuance and thereby avoiding the necessity of curtailing losses by closing them. The board has effected economies which have reduced the loss on branch lines from £165,718 in 1931-32 to £69,877 in 1933-34. While part of the fall in traffic may be ascribed to the depression in trade, the greater portion is due to competitive road services operating in the districts.

The Otago Central Line, for example, is rendering valuable service to the district. The principal traffics are live stock and fruit, and neither could be more quickly served or so cheaply as by rail. Moreover the fruit industry has been built up on the cheap rates afforded by the railways. Competitive road motor services, however, catering for the higher classes of traffic, are operating over very long distances in competition with the railway. This cannot be said to be in the national interest, and in any case could not be held to justify the expenditure involved in such a duplication of transport facilities. Last year again showed a net loss on operating and the board has renewed its appeal to the people of the district, in justice to the country in general which is bearing the loss, to support the railway with their traffic. Some responsibility for this state of affairs of course lies with the transport licensing authorities who sanction the competitive services, but the matter really rests with the inhabitants of the district, who themselves determine whether they will use the road or the rail. The case of the Otago Central Line is not unique and the board has again appealed to the people in the districts served by branch lines to help it to improve their financial position and so justify continued working without forcing the board to reduce services or increase charges.

#### **One-Man Road Hauliers**

The position has been aggravated in New Zealand by the system under which road carriers operate. There are no large firms of road hauliers as in England, but most of the competition arises from small concerns frequently consisting of one man who has obtained a vehicle on the hire purchase system. He knows nothing about depreciation and similar items, but having calculated what it will cost him to haul a consignment, quotes a figure which is naturally much lower than the railway rate. He thus obtains traffic which formerly passed by rail and for a time goes on paying his instalments and having a small margin for himself. After a time, however, having allowed nothing for repairs and other charges, he finds himself unable to meet his liabilities, and as he fails to pay the instalments the car dealer forecloses on the vehicle and the haulier goes out of business. The dealer has, however, obtained sufficient payments to cover himself, and having regained possession of the vehicle sells it to another man on similar hire purchase terms, and the process is repeated indefinitely. The Railways Board is in favour of co-ordination and co-operation with road hauliers, but there are no firms of standing in the business and it is impossible to come to any arrangements with individuals of the kind mentioned.

## HIGH SPEED AND THE STEAM LOCOMOTIVE

*Abstract of a paper presented yesterday by  
Dr.-Ing. eh R. P. Wagner, Honorary Member,  
to the Institution of Locomotive Engineers*

A PAPER with the above title was read yesterday (Thursday) evening at a meeting of the Institution of Locomotive Engineers in London. After paying tribute to the part played by Great Britain in the evolution of the locomotive, and referring especially to the 4-2-2 type of engine as built in this country as one of the most beautiful locomotives ever constructed for high speed service, Dr. Wagner proceeded to a general survey of the subject; he remarked at the outset that in order to be able to run trial trains, and presumably later on passenger trains, on a 100-m.p.h. schedule, a locomotive should be laid out for at least 110 m.p.h. The customary, or a slightly increased, piston velocity leads necessarily to driving wheels of large diameter, provided that the ordinary type of drive is maintained. Smaller coupled wheels could be used by imitating the electric single-drive locomotive, that is by fitting every individual pair of drivers with a hollow axle drive of the Buchli or Secheron type. Each hollow axle could easily be driven by a two or three-cylinder high speed steam motor completely cased and fastened rigidly to the main frame. The idea was tempting, but careful calculation showed that a drive of this type was bound to be heavier and more expensive than the customary practice.

For this reason a driving wheel diameter of 7 ft. 6 in. seems adequate for 100 to 110 m.p.h. The number of drivers depends upon the number of coaches to be hauled, and on the wheel load. The former was, in a case in the author's mind, set at 200 to 220 tons, equal to a train of four heavy or five light steel coaches, the latter at 18 tons per driving axle, so as to give the locomotive access to all main lines, even to those not yet reconstructed for 20 tons. Figuring on this basis, two pairs of drivers would seem sufficient, but, on the other hand, it is well known that two pairs of drivers running between non-coupled leading and rear wheels tend to slip. Moreover, the hard wheel and rail material lately used results in smaller contact areas between wheel and rail and, as has often been noticed, in more frequent slipping. The adhesion factor, which in fast running engines has always been assumed not higher than one-sixth, should be revised by future tests based upon contact faces of hard steel. In any case, the acceleration of the train is a matter of such importance, especially when speeding up to 100 m.p.h., that it seems wise to employ a third pair of coupled wheels. A calculation of boiler capacity and weight for the train load quoted shows that at least six pairs of wheels are necessary to carry the superstructure, and that the weight available would certainly justify a third pair of drivers.

That in a very fast running locomotive the drivers should be preceded by a four-wheeled bogie truck with the very best spring suspension imaginable will be agreed to by all locomotive experts; a point where designers disagree has always been the trailing pair of wheels. Apart from the fact that the boiler and frame weight demands more wheels, it would, in locomotives of this size, be impossible to leave out a rear support, because the grate required could never be squeezed in between the drivers. So when the designer has decided to arrange a wide firebox behind the drivers he is practically bound hand and foot as to the weight to be assigned to the trailing wheels.

Experience and calculation show that usually the weight of the firebox of a 1,600 to 1,800 h.p. boiler loads a single pair of trailers fully up to the weight allotted to the drivers.

### Air Resistance and Streamlining

Another subject demanding serious consideration in designing a locomotive for 100 m.p.h. or more is the air resistance. This resistance can be overcome by using more power, but the burden upon the coal budget can be eased by covering the entire locomotive and tender so as to eliminate the influence of protruding parts, including wheels, rods and brake components. It is hopeless to streamline a locomotive, including the tender, completely, just as the streamlining of railcars is bound to be imperfect. But many a good effect can be obtained by comparing various methods of covering up a locomotive, especially as the covering may interfere with the outlook from the cab, and consequently involve modifying the entire layout of the locomotive. For these reasons the German State Railway, and before them the Borsig Locomotive Works, had some wooden models tested in wind channels. These tests were preceded by a great number of air resistance tests on the German State Railway during the last five years. They were carried out on test trains with the object of finding a new formula for the several factors of train resistance. The result, summed up roughly, was that the air resistance of passenger coaches could be represented by the formula:—

$$0.0048 (n + 2.7) f V^2$$

In which  $n$  is the number of coaches; 2.7 is a factor representing the air suction behind the last coach;  $f$  is the cross section part of each coach not shielded by its forerunner (equal to 1.5 sq. metres);  $V$  is the speed relative to the existing motion of the air (wind factor).

These tests were run with an uncovered steam locomotive of a fairly old 4-6-0 type, and a corridor train of standard coaches. In order to investigate the merits of various layouts of the locomotive, wind tests on small scale models were indispensable. In each case the engine model was followed by a part of a train long enough to eliminate the influence of rear suction. As all these wind tests bore out each other better than expected, it will be sufficient to record the results of the shortest and, as to the result, most lucid series of tests. The first model, meant to serve as a basis, was that of an uncovered 4-6-4 locomotive with an uncovered tender, built according to customary practice. The second model represented the same locomotive fully covered, with a tender covered in a manner which has since been effectually improved.

The third model represented a 6-6-4 tank engine, which owing to restricted coal and water storage was a less powerful type. It was interesting in view of the project of Henschel & Sohn (Kassel) to build such a locomotive, specially fitted for and combined with a train of four very light coaches of special design. This model was noteworthy in that it represented a locomotive with boiler reversed and cab in front. As the covering resembled strongly that of a coach body and filled the same cross section, the figures attained may be passably representative for any locomotive of this layout, though some percentage should be added to its air resistance in case a tender, even a covered one, were added. The covered



4-6-4 locomotive (model No. 2) saves roughly 2,200 lb., mostly in the shape of head resistance, whereas the resistance of the tank engine runs as low as 550 lb., though probably the adding of a tender would raise this figure to 1,300-1,400 lb.

The possible saving in one case would be roughly 2,200 lb., equal to 630 h.p.; in the other case it would be 3,000 lb., or roughly 850 h.p. The figures show that the head air resistance of the locomotive could be overcome by retaining the customary designing practice, furnishing more power and leaving some work to be done by our successors, but they show also that power and fuel saving can be attained by covering. Moreover, the figures show that reversing the boiler does not bring out a decisive advantage over a customary locomotive entirely covered.

#### Covering the Motion

A reasonable shape for the streamlined locomotive was found, yet nobody knew how the petticoat would affect the lubrication and the temperature of the rod and axle bearings. To find this out, one of the modern light Pacifics was petticoated all around below the platform and had a parabolic smokebox hook fitted. A thorough series of train test runs, during which 88 m.p.h. was maintained and 90 m.p.h. often reached, showed that the temperature of most axle bearings rose indifferently, that of the rear axle of the leading bogie truck by about 35° F., whereas the temperature of the sensitive rear main rod bearing tended to drop somewhat. The tests showed, moreover, that at this speed petticoating saved from 190 h.p. at 78 m.p.h. as compared to an uncoated engine of the same type. All these considerations provided the basis for the design of the new type of locomotive. The first two engines were consequently laid out as 4-6-4 engines with drivers of 7 ft. 6 in. dia. and rear cab.

#### Boiler and Other Details

The boiler has been laid out for a grate area of 51 sq. ft., for a heating surface of 2,938 sq. ft. for evaporation, and for a superheater surface of 969 sq. ft. The boiler pressure was set at 284.5 lb. per sq. in. This pressure still permitted the use of a copper firebox. The boiler diameter of the heavy German Pacific (6 ft. 3 in.) has been retained, since the test locomotive requires very slightly more power than the Pacific. The number of smoke tubes (24) of 6½ in.-6¾ in. dia. was also retained, and so was the three-loop superheater with pipes of 1½-1¾ in. The number of fire tubes is 106 and their diameter 2¼-2½ in. The length of tubes has, for the first time in Germany, been made 23 ft., or 8 in. more than in the heavy Pacific. The smokebox is naturally rather long, so that the feed-water heater found room behind the chimney, this enabled the front part, ahead of the chimney, to be given a sloping top somewhat according to Mr. Gresley's model in order to deflect smoke and steam from the cab windows. The locomotive frame is of the bar type and 3½ in. in thickness. The smokebox rests upon it by means of a welded saddle-like structure.

In order to ensure smooth running at the highest speeds without passing through one or more critical speeds, the locomotive has been designed with three cylinders of 18 in. dia. each and 26 in. stroke, working at angles of 120 deg. All cylinders are horizontal. The outside pair drives the second pair of coupled wheels, and the inside cylinder the first pair. All cylinders have an independent Walschaert gear; the inside link motion has been taken off the second coupled axle by an inside crank instead of an eccentric.

#### Braking Considerations

Considering the high travelling speed and the low brake shoe friction factor at high speed, some unusual designs

of braking had to be used. The maximum stopping distance was to be roughly 1,100 yd.; to attain this the driving wheels and those of the rear engine truck were designed for 180 per cent. of shoe pressure, i.e., the sum of the pressure of all shoes was to be 180 per cent. of the pressure of their wheels upon the rail. This pressure, applied at high speed only, is automatically adapted to the retardation by controlling the air pressure in the brake cylinders. Naturally the former German practice of applying one shoe only to each wheel had to be dropped; in fact it had been dropped previously for all locomotives designed for 80 m.p.h. Special measures were taken to give room for two brake shoes between adjacent driving wheels without increasing the distance apart of the wheels.

The braking percentage of the front bogie truck has been chosen considerably lower than the engine brake, so as not to interfere with its guiding qualities. The leading pair of wheels is subject to 50 per cent. brake pressure only, applied by one shoe to a wheel; the rear wheel set of the truck has 80 per cent. brake pressure, applied by two shoes.

#### Design of the Tender

A number of unusual features is embodied in the tender. A water supply of 37 cu. m., equal to 8,039 imp. gall., and a coal supply of 10 tons, was considered necessary to run 200 miles without stopping for water supply, and 400 miles without refuelling. These capacities demanded five pairs of wheels at 9 tons wheel pressure upon the rails. If they were assembled in one rigid frame, the running curves would have been impaired by the heavy flange pressure of the leading wheel; on the other hand, if assembled in two bogie trucks, the wheel base would have exceeded that of the standard turntables. A solution combining good running qualities and fairly short wheel base was found by grouping the first pairs of wheels in a bogie truck and placing the rear group in the main frame at short wheel distances. This frame extends into the water tank and forms a strong bridge over the bogie truck taking up the tractive forces. Frame and tank are arc welded throughout. The space underneath the tank is petticoated.

As has been mentioned, two locomotives are being built at the Borsig Locomotive Works at Berlin; the first one has left the shop and will undergo thorough road tests at the Grunewald Testing Department of the German State Railway.

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**THE INDIA BUDGET.** — A Reuters telegram from New Delhi reports that Sir Joseph Bore's last railway budget shows a considerably improved position on Indian railways. It anticipates that total gross receipts for the year ending March 31 next will be £3 million more than in 1933-34, though expenses will probably be only £500,000 higher; total expenditure, including £10¼ million set aside for depreciation, should be about £48 million. Due to a reduction in interest charges, commercial lines are expected to show a deficit of only £1,750,000 and strategic lines £1,300,000, sums to be met from the depreciation fund. The new budget anticipates increases of £2 million in receipts, but only £750,000 in ordinary working expenditure, which is partly offset by reduced provision for depreciation, calculated by a simpler method. Most of the £750,000 increase is due to restoration of pay and salary cuts next year. A balanced budget is expected except for a £1½ million deficit on strategic lines. £11¼ million are allowed for capital expenditure in 1935-36, including £3½ million for rolling stock, of which £750,000 are for locomotives and boilers and the balance for carriage and wagon stock.

## NEW HIGH SPEED STEAM LOCOMOTIVE DESIGNS IN GERMANY

*Speeds up to 110 m.p.h. secured by streamlining existing locomotives and by new designs embodying standard components*

THERE is at present a remarkable concentration of interest in Germany on the development of steam locomotives for higher speeds. Several causes have contributed to this activity, among them the competition of other means of transport necessitating higher schedule speeds, the urge of the new régime to keep in the forefront of progress, and the national policy of effecting every possible improvement in coal-burning equipment in order to reduce the dependence on imported oil fuel. The bearing of these considerations, the trend of research and design, and the latest developments in streamlined constructions may be illustrated by references to a paper by Direktor Dr.-Ing. Litz\* on the position and possible developments of coal-fired steam locomotives, and the concluding portions of an address by Professor Dr.-Ing. H. Nordmann,† of the German State Railway, negating any suggestion that the steam locomotive has reached the end of its development, much less become obsolete. The situation revealed by these papers and by the discussion of Professor Nordmann's address indicates that the immediate future of the steam locomotive in Germany will be full of interest. Indeed, there have hardly ever before been so many new types of locomotives under development by the German State Railway, all characterised by a substantial increase in speed without appreciable sacrifice of haulage capacity.

### Capabilities of Steam

Both Professor Nordmann and Dr. Litz pay special tributes to the performance of steam locomotives in Germany and emphasise the predominant position of this type. The total number of steam locomotives on all German railways (including narrow-gauge and private railways) is about 22,300, compared with 640 electric locomotives and 1,450 railcars of various types. In other words, steam locomotives represent about 91 per cent. of the total motive power. They are responsible for 92 per cent. of the annual locomotive mileage of the German State Railway, and they consume 35 to 40 million tons of coal per annum, or about 15 per cent. of the total German production. Though unrelaxed efforts will continue to be directed towards the improvement of efficiency, it is now national policy to encourage the use of coal instead of imported oil.

The present loads and maximum speeds for German locomotives in normal service are approximately as follows:—

	Tons	Speed
Express trains . . .	350-500	120 km. (74.6 miles) per hr.
Stopping passenger trains	500-600	100 km. (62.1 miles) per hr.
Goods trains . . .	1,000-1,200	70 km. (43.5 miles) per hr.

These figures correspond to maximum sustained outputs of 2,000 to 2,500 h.p. Several types of standard (*Einheits*) locomotives and also the Bavarian S 3/6 locomotives (4-6-2, four-cylinder compound) have, however, sustained an average of 140 km. (87 miles) per hr. and reached a maximum of 153 km. (95 miles) an hour on the Berlin-Hamburg line, and have exceeded the 77.4 m.p.h. start

to stop schedule of the Flying Hamburger by only a few minutes. It is remarkable that, in the words of Dr. Litz, so little notice has been taken of the fact that a steam locomotive built for a maximum speed of 120 km. (74.6 miles) per hr. is able, after ten years in service and without any special preparation, practically to equal the performance of the Flying Hamburger.

The Flying Hamburger was the first to establish regular service involving speeds up to 160 km. (99.4 miles) per hr.

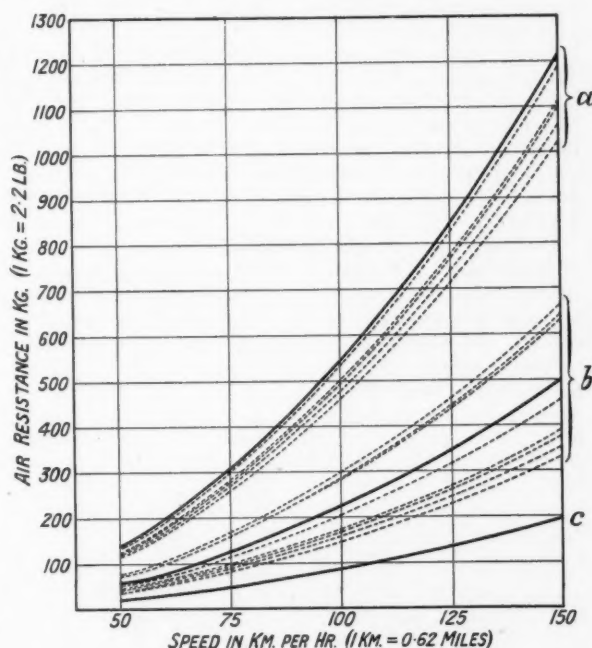


Fig. 1—Air resistance of 4-6-4 and 6-6-4 locomotives with various degrees of streamlining

for the transport of 100 passengers and its immediate success led many to believe that further developments in high-speed rail transport could be attained only by motorisation. The experience of the last two years has shown, however, that the steam locomotive is capable of development for speeds and loads meeting all requirements for many years to come. Nor does this require the use of extra-high pressure, turbine, pulverised coal, or other special types of locomotives designed primarily to improve thermal economy and involving more or less radical departure from established construction. Existing standard types of locomotives can be developed organically and by streamlining for speeds of 175 km. (108.7 miles) per hr. in express, and 90 km. (55.9 miles) per hr. in goods service.

### Trial Data

The practicability of improving schedules with existing locomotives is demonstrated by the trials of a 4-6-2 Series-03 locomotive hauling light express trains on the Hamburg line at speeds up to 140 km. (87 miles) per hr.,

\* At the Sixth Technical Session of the Verein für die bergbauliche Interessen (Mining Association), Essen. *Glückauf*, December 29, 1934.

† Before the Deutschen Maschinentechnische Gesellschaft (German Mechanical Society). *Glaser's Annalen*, August 1, 1934.

although this machine was originally intended for 120 km. (74.6 miles) per hr. Dynamometer car records with trains of from 200 to 240 tons show an average rate of steaming about 20 per cent. below the usual full loading (57 kg. per sq. m., or 11.7 lb. per sq. ft. per hr.), the highest recorded boiler loading being 51.7 kg. per sq. m. (10.6 lb. per sq. ft.) per hr. The highest speed during these trials was 144 km. (89.5 miles) per hr., but nearly 160 km. (99.4 miles) per hr. is said to have been reached on other occasions with standard 4-6-2 locomotives.

Until recently, says Professor Nordmann, a three or four-cylinder balanced locomotive would have been chosen if the problem was to design a machine for 140 km. (87 miles) per hr., and doubts would have been entertained as to the practicability of the simple, two-cylinder Series-03 machines in such service. Smoother running would, no doubt, be obtained with the multi-cylinder locomotive, but the performance of the Series-03 locomotive is quite satisfactory if the bearings are well cared for. The four-cylinder 25 at. (355 lb. per sq. in.) Series-04 locomotive was designed from the first for a speed of 130 km. (80.8 miles) per hr. and runs satisfactorily at higher speeds; the four-cylinder compound construction followed naturally, in this case, from the high boiler pressure. It may be added that a speed of 154 km. (95.7 miles) per hr. has been reached with the former 4-6-2 four-cylinder Baden locomotive (C IV H) hauling a light express train.

#### Air Resistance

Trials such as those mentioned above having demonstrated that existing standard locomotives are mechanically capable of higher speeds, the first step towards the improvement of schedules consists in reducing air resistance by streamlining, thus leaving a margin of power available for the attainment of higher speeds. The latest German developments in this direction are based on an extensive series of researches. Wind-tunnel tests were undertaken by the Borsig locomotive works at the Technische Hochschule, Berlin, under the direction of Professor Föttinger, in the year 1932, that is, before the Flying Hamburger was placed in service. More recently, measurements have been made by the German State Railway on large-scale (1:10) models in the wind tunnel of the Kaiser Wilhelm Institute, Göttingen, double models being used, one upside down and in wheel-to-wheel contact with the other, provision being made for turning the suspension carriage to obtain measurements of oblique wind pressure. Various air speeds have been employed up to 50 metres per sec. (112 m.p.h.), corresponding to a most violent hurricane.

The heavy curves in Fig. 1, calculated from wind-tunnel tests, are given by Dr. Litz as representing the air resistance of full-sized locomotives at various speeds relative to the air (*i.e.*, locomotive speed *plus* opposing wind speed) up to 150 km. (93.2 miles) per hr. The same curves are given by Professor Nordmann and, in addition, the dotted curves with the following explanation:—

*Curves (a).*—The upper, solid curve shows the air resistance of a standard three-cylinder 4-6-4 express tender locomotive arrangement with smoke deflector plates, but no special streamlining. The dotted curves in this group show the relatively small advantage derived from "homœopathic doses" of streamlining in the form of a hemispherical smokebox door, wedge-shaped cab front, and so on.

*Curves (b).*—This group of curves relates to a 4-6-4 tender locomotive with various degrees of streamlining culminating, in the lowest dotted curve of the group, in an almost completely encased machine with a streamlined apron enclosing the motion work and wheels nearly down to rail level, the tender being included in the eddy-free

air flow. The solid curve represents the result of less complete streamlining.

*Curve (c).*—Whereas groups (a) and (b) relate to 4-6-4 tender locomotives running chimney in front, curve (c) relates to the extreme case of a 6-6-4 tank locomotive running cab-first with completely enclosed and streamlined cab, apron over the leading six wheels, and disc-type driving and trailing wheels. This machine is less powerful than the 4-6-4 locomotive, but is subject to substantially lower air resistance.

At 150 km. (93.2 miles) per hr., the air resistance corresponding to the highest of the group (b) curves in Fig. 1 is about 560 kg. (1,235 lb.) less than that corresponding to the top curve in group (a); and the difference between the latter and (c) is about 1,020 kg. (2,249 lb.). The corresponding savings in power are about 310 h.p. and 560 h.p. respectively. In other words, compared with the standard 4-6-4 locomotive, a saving of at least 300 h.p. at 93 m.p.h. can be effected by streamlined enclosure of the boiler and motion work; and in extreme cases, such as that of an encased tank locomotive, between 500 and 600 h.p. may be saved. According to Dr. Litz, the air resistance of a streamlined locomotive and tender, curve (b), Fig. 1, is only about 40 per cent. of that of the same locomotive without streamlining or enclosure at a speed of 170 km. (105.6 miles) per hr.

French tests mentioned by Dr. Litz have shown that the wind resistance of ordinary smoke-lifting plates mounted alongside the smokebox may be equivalent to from 100 to 150 h.p. at 150 km. (93.2 miles) per hr. Measurements on various models in the Göttingen wind tunnel show that the most effective arrangement of smoke deflectors for a locomotive with streamline casing consists of narrow plates at each side of the chimney, the roof of the casing over the smokebox being slightly inclined downwards towards the front. This gives the driver a clear outlook and adds very little to the air resistance.

#### Enclosure of Motion Work

Though the above-mentioned wind tunnel tests demonstrate the progressive reduction in air resistance resulting from increasing approximation to perfect streamlining, including the enclosure of the motion work and wheels down to rail level, it is essential to provide for easy access to all parts needing lubrication or other attention. Also, the question arises whether the enclosure of the motion work may result in overheating of axle boxes and the bearings of driving and coupling rods. In order to settle this point, the German State Railway ordered from the Borsig locomotive works an express locomotive with the same leading dimensions as the standard 4-6-2 Series-03 machines, but with an ellipsoidal smokebox door and wind-cutting cab. As shown by Figs. 2 and 3, the large smoke-lifting plates are retained and no attempt is made to provide true streamlining of the upper part of the locomotive, the primary purpose being to investigate the practicability of the enclosed motion work. This locomotive underwent a number of high-speed trials last summer and according to Professor Nordmann's reports, its performance has exceeded expectations. No difficulty is experienced in gaining access to the motion work through the inspection doors visible in Fig. 2, and no trouble arises from overheating of the bearings which reach a temperature of 20° C. (36° F.) higher than in ordinary service. On the other hand, it is found that the enclosure of the motion work results in a saving of 150-200 h.p. at 140 km. (87 miles) per hr., equivalent to about 20 per cent. increase in effective drawbar pull compared with an unenclosed locomotive of the same type.

The general conclusion to be drawn from the wind-



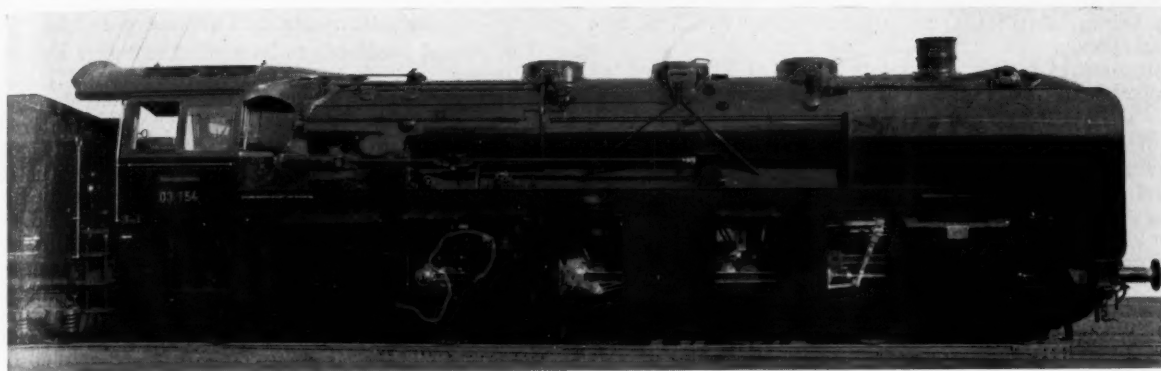


Fig. 2—4-6-2 express locomotive Series-03 built by the Borsig locomotive works to the order of the German State Railway, primarily to determine the effect of enclosing the motion work

tunnel tests and the trials of the Borsig locomotive (Fig. 2) is that enclosure of the motion work should be considered for any locomotive which has to run for long periods at over 120 km. (74.6 miles) per hr., and that complete streamlining is economically essential for speeds exceeding 150 km. (93.2 miles) per hr.

#### New Constructions

The accompanying drawings, Figs. 4-6, illustrate the application of streamlining to designs intended for speeds up to 105-110 m.p.h. Thus, the 4-6-4 locomotive illustrated in Fig. 4 is characterised by a streamlined casing which extends from a head-end form of the high-speed railcar type and includes boiler, cab, tender, motion work and wheels practically down to rail level. Two Series-05 locomotives of this type under construction by the Borsig locomotive works for speeds up to 175 km. (108.7 miles) per hr., have small smoke-deflectors on top of the smokebox as already noted. The large driving wheels, of 2,300 mm. (7 ft. 6½ in.) diameter, are appropriate to the high running speed; and a low consumption should result from the improved steam conditions. Steam is generated at 20 at. (284 lb.) gauge pressure, 410° C. (770° F.), and there are three cylinders with simple expansion. These locomotives are intended to haul a load of about 250 tons, i.e., five coaches seating 250-300 passengers, at 175 km. (108.7 miles) per hr. on level track.

Fig. 5 shows another streamlined locomotive of the same type and power arranged, however, for pulverised firing, with the cab leading and automatic transference of fuel from the tender to the firebox. The unimpeded outlook from the leading cab and the complete elimination of obstruction by smoke are specially important at high speeds. Yet another design is illustrated by Fig. 6, this time for a streamlined tank locomotive with enclosed high-speed engine and jackshaft drive.

Referring to the streamlined 4-4-2 tank locomotive\* originally designed by Henschel & Sohn A.G. for high-speed railcar service, that the 4-4-2 wheel arrangement was very popular for fast locomotives some 25 years ago until their tractive effort became inadequate for the loads to be hauled. There is thus a rational case for reverting to this arrangement for light high-speed service, for example, the haulage of two coaches with 128 seats, and even a conservative estimate is said to show costs per seat-mile lower than those of the Flying Hamburger. The schedule provides for a normal speed of 150 km. (93.2 miles) per hr. rising to 160 km. (99.4 miles) per hr. for short distances on level track. The present tendency in Germany is, however, towards railcar assemblies of

great seating capacity, and the latest Henschel design is therefore for a train of four special light coaches hauled by a streamlined 4-6-4 tank locomotive of the construction illustrated in Fig. 7.

Two machines of this type, Series 61, have been ordered from the firm for hauling trains of four light coaches at speeds of 160-170 km. (99.4-105.6 miles) per hr. The cab is in the usual position between boiler and bunker, and the two ends of the locomotive are streamlined to practically the same form so that the coaches can be coupled to either end.

In addition to the Borsig and Henschel locomotives for extra high speeds, there are under construction by the firm of Krupp two 4-8-4 locomotives capable of hauling heavy passenger trains, up to 650 tons, at 140 km. (87 miles) per hr.

Light locomotives with 2-4-2 wheel arrangement and semi-automatic stoking are under construction by the firms

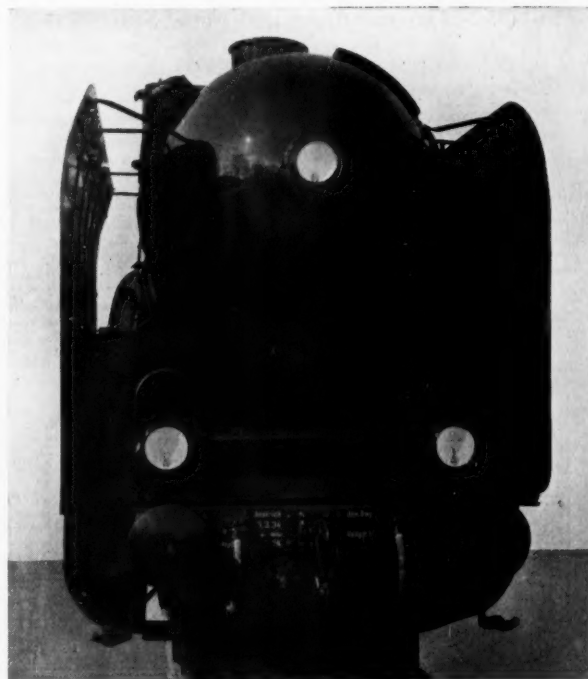


Fig. 3—Borsig 4-6-2 Series-03 locomotive with parabolic front end and enclosed motion work

\* See THE RAILWAY GAZETTE, January 26, 1934, page 133.

of Schwartzkopff (Berliner Maschinenbau A.G.), Krupp, and Borsig. These machines are intended for one-man operation at speeds up to 100 km. (62.1 miles) per hr. on secondary railways and in feeder service on main lines.

#### Fast Goods Locomotives

The average speed of the older German goods locomotives is limited to 55-65 km. (34.2-40.4 miles) per hr., and that of the standard (*Einheits*) goods locomotives to 70 km. (43.5 miles) per hr. Fast goods trains run at up to 90 km. (55.9 miles) per hr., the well-known Series P 10 locomotives being principally concerned in such service. The German State Railway Company has now decided to develop new series of heavy goods locomotives for 90 km. (55.9 miles) per hr., and there are under construction locomotives of the 2-10-2 type by Henschel & Sohn for hauling 1,500 tons, and of the 2-8-2 type by the firm of Schwartzkopff for fast goods trains of 800-900 tons.

An important feature of these and other new locomotives in the programme of development is the use of standard cylinders, boilers, springs, tenders, and other components by the different makers. A further illustration of the economical means by which higher speeds are being secured is to be found in the modification of an eight-coupled goods locomotive of the old Prussian Series G81, originally intended for a maximum speed of 55 km. (34.2 miles) per hr., but raised to 75 km. (46.6 miles) per hr. by the addition of a leading axle.

#### Requirements and Desiderata

The general conditions to be fulfilled to ensure economy and safety in high-speed operation include: (1) Good maintenance of locomotives and coaches, including reliable lubrication and small play in bearings. (2) Appropriate braking, unobstructed cab outlook, and location of signals to meet the requirements of safety and comfort. The distance between distant and home signals has already been increased from 700 to 1,000 metres (765 to 1,094 yd.) on a number of the more important German lines. (3) A high standard of permanent way construction and maintenance, with suitable curves, superelevation and points. Curves have already been eased on a number of German lines, and the German State Railway has in preparation new 1:18.5 points of 1,200 metres (3,937 ft.) radius permitting a speed of 100 km. (62.1 miles) per hr. in the turn-out. (4) High acceleration to permit rapid starting and quick recovery after speed reductions. The 4-6-4 locomotives mentioned above require 8 to 9 min. to attain 170 km. (105.6 miles) per hr.; during this period they travel about 17 km. (10.6 miles) and lose 2 or 3 min. compared with the time required to traverse the same distance at full speed. As, however, an electric locomotive or rail car would require about 7 min. for acceleration, the net loss by the steam locomotive is 1 to 2 min., which is not serious as express trains start so infrequently.

In the discussion on Professor Nordmann's paper, Pro-

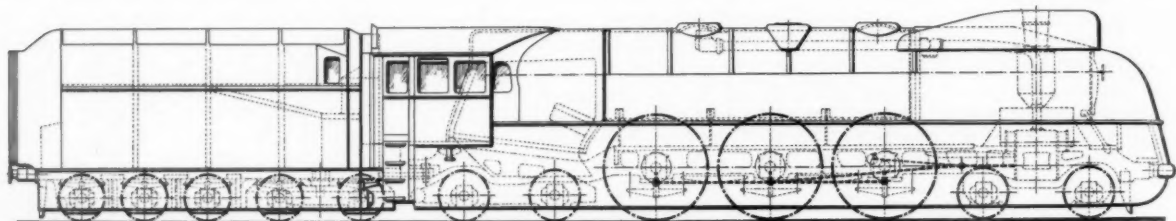


Fig. 4—Application of streamlining to a 4-6-4 superheated, three-cylinder express locomotive, for speeds of 150-170 km. (93.2-105.6 miles) per hr. Two Series-05 machines of this type are under construction by the Borsig locomotive works for speeds up to 175 km. (108.7 miles) an hour

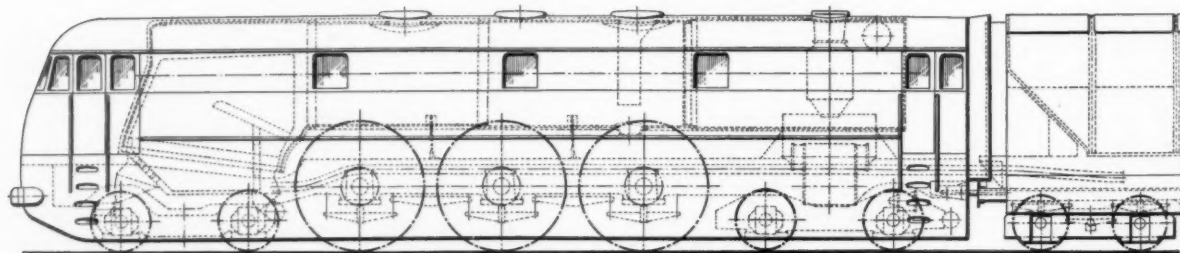


Fig. 5—4-6-4 streamlined locomotive by the Borsig locomotive works for pulverised coal firing

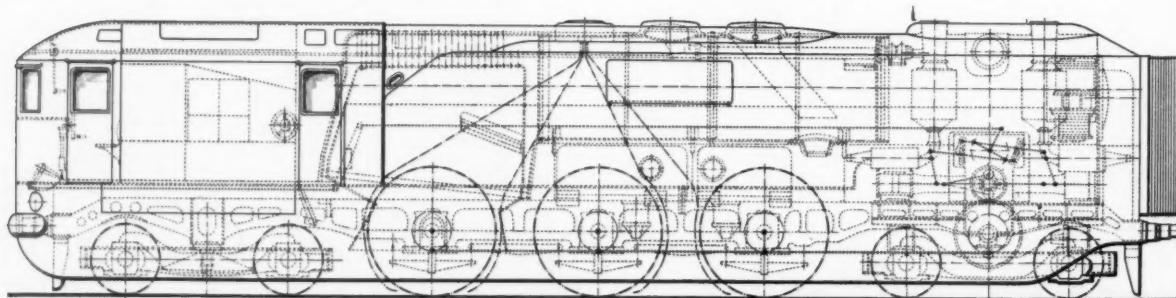


Fig. 6—Design for 4-6-4 superheated, four-cylinder compound express tank locomotive enclosed high-speed engine and jackshaft drive for speeds of 150-170 km. (93.2-105.6 miles) an hour

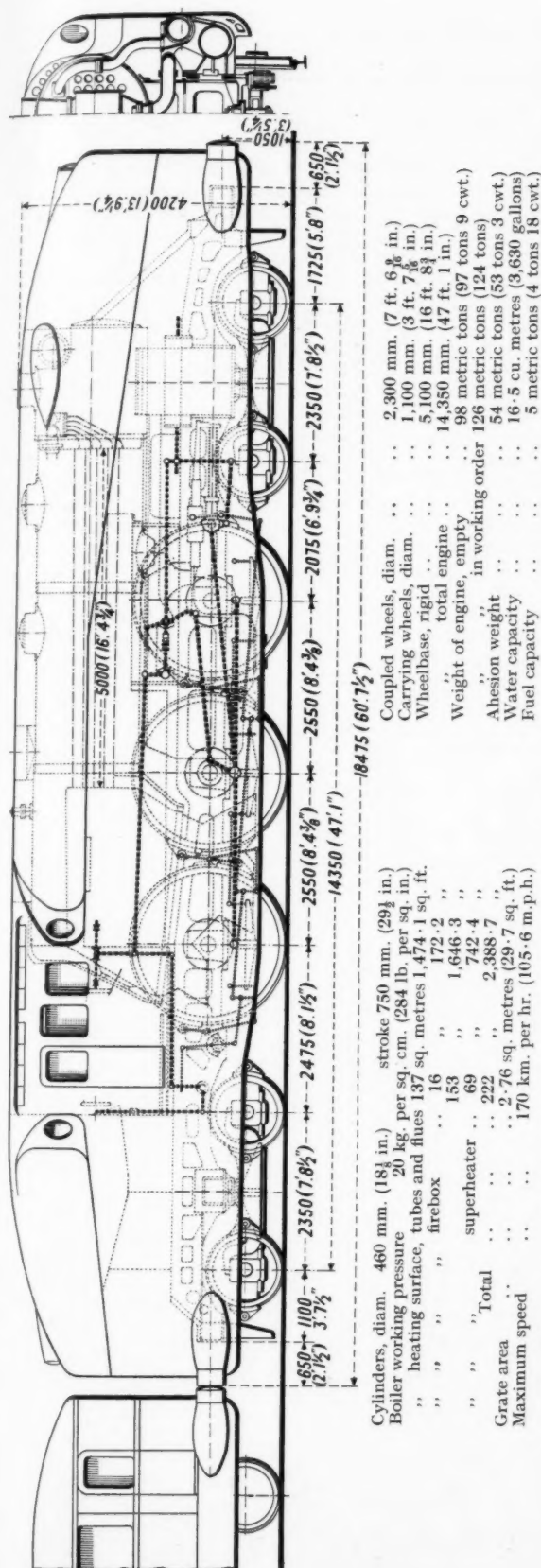


Fig. 7—Streamlined 4-6-4 type high-speed locomotive under construction at the works of Henschel & Sohn A.G., Kassel

fessor Dr. Ing. F. Neesen emphasises the importance of reducing the dead weight of high-speed locomotives, which may be effected by: (1) Reducing the boiler weight, by reducing the water capacity, increasing the thermal loading of the heating surface, and increasing the boiler efficiency. The use of a Velox boiler is suggested. (2) Using an automatic stoker to secure the finer furnace regulation necessitated by the smaller water capacity. Automatic firing has the further advantage that the cab can easily be placed in front. (3) Reducing the weight of coal and water by condensing operation, the most favourable arrangement being a reciprocating engine, with an exhaust turbine to drive feed pumps, condenser auxiliaries, suction fan, electric lighting generator, and other auxiliaries. (4) Using a geared steam motor to eliminate the unfavourable effect of reciprocating masses.

In the opinion of Dr. Litz, these recommendations are a matter for future development, the immediate concern being with less revolutionary projects. Professor Nordmann, in his reply to the discussion, also emphasises that while every encouragement is properly given to the design and trial of radical innovations in steam locomotives, considerations of existing equipment and reliability in service demand that new requirements be met, as far as possible, by the use of proven components and by the modification and development of existing machines.

#### Cost Comparisons

The first cost of a modern 4-6-4 locomotive designed for a maximum speed of 175 km. (108.7 miles) per hr. and developing about 3,000 h.p. is given by Dr. Litz as about 265,000 marks (£13,250 at 20 mk. = £1). A 2-8-2 electric locomotive, such as that under construction by the A.E.G. for a maximum speed of 140 km. (87 miles) per hr., is about 400,000 marks (£20,000). A diesel-electric railcar, like the Flying Hamburger, costs about 450,000 marks (£22,500) for 820 h.p., this figure including the coach itself. For the price of two such railcars one could purchase a complete train comprising a high-speed steam locomotive and five or six coaches, with 50 per cent. higher power and correspondingly increased accommodation compared with the two railcars.

The reports of the German State Railway for the years 1932 and 1933 show the average repair costs of all locomotives and railcars to be as follow:—

	1932		1933	
	Marks per 1,000 km.	£* per 1,000 miles	Marks per 1,000 km.	£* per 1,000 miles
Steam locomotives	231.7	£18 13s.	235.7	£18 19s.
Electric locomotives	275.7	£22 4s.	231.1	£18 12s.
Railcars	151.8	£12 4s.	162.3	£13 1s.

\* At 20 marks = £1.

In considering these figures, it must be remembered that all the railcars are of recent construction, whereas the figures for steam locomotives are the averages for 20,000 machines, only 6 per cent. of which are less than 10 years old.

The coal consumption of German steam locomotives averages 12.73 metric tons per 1,000 locomotive-km. (20.2 tons per 1,000 miles). Corresponding data for electric locomotives and railcars are not yet available, but according to Dr. Litz electrical operation cannot be cheaper than steam working if the price of electricity exceeds 3 pf. per kWh. (0.36d. per unit at 20 mk. = £1); and the running costs of railcars "for a number of reasons cannot be lower than those of a steam locomotive."



## RAILWAY WHEELS AND AXLES

### II—Wheel lathe design and some suggested improvements

By C. D. ANDREW, M.I.Mech.E.

**C**ONTINUING with the subject of the wagon or coach wheel lathe, which for convenience may be called the car wheel lathe, it is of interest to recall briefly the evolution of this type of machine to meet the demands of railway engineers and rolling stock manufacturers.

Up to the beginning of the present century, the design remained fairly constant, and very simple. Driving bars were attached to the two faceplates, and ordinary round-nosed tools were used. This involved considerable mechanical weakness and lack of rigidity due to the transmission of the driving force through a long shaft located in the bed, which carried pinions gearing directly into the faceplates; the torsional strain in this shaft caused chatter of the gears at the outer headstock. Attempts were made later to overcome this defect by using a shaft of large diameter, but without really good results, as the principle was wrong. Round about 1900 the central drive type of lathe appeared on the market, in which the main driving gear and faceplates were placed between the pair of wheels to be turned, thus equalising the drive, and at the same time the axle journals were secured and supported rigidly by chuck jaws set into the two tailstocks of the lathe. A number of different cutting tools were used, generally five for each tool-holder, to rough out and form the profile of the tyre.

To secure greater rigidity and smoothness of cut, it then became necessary to lock the wheels more firmly to the faceplates by the use of unyielding dogs, gripping upon both sides of each tyre, and the journals were supported in split collets in the spindle nose. A later improvement was the use of a pneumatic (or electrical) clamp to secure and release the cutting tools quickly, and by the use of combination forming tools it became possible to quicken still further the operation of the lathe.

A variation in the design of this lathe is the replacement of the ordinary slide rests by vertical turret tool-holders, carrying heavy section form tools secured in a vertical position, and adjustable upwards to provide for wear. While the central drive lathe is still in fairly common use, particularly abroad, the end-driven wheel lathe has been so greatly improved in design in recent years that there appears to be no particular advantage in the use of the central drive lathe, except possibly for wood-centre coach wheels.

#### End-Driven Lathes

The end-driven lathe has received considerably more attention from machine tool designers owing to its greater simplicity, and the fact that the drive to the two faceplates has now been equalised. The early arrangement of a driving shaft in the bed with pinions gearing direct into the faceplates at the lowest point of their circumference was unsatisfactory because of the risk of damage to the gears by the chips; also because the ideal position for the driving pinion is a point slightly below the horizontal centre line of the spindles (Fig. 1); the downward pull of the

pinion being close under the cutting tool gives the most rigid drive. The first alteration in this direction was to locate the first driving shaft outside the bed and use a short auxiliary shaft to each faceplate, these shafts being located near the horizontal centre line and carrying the driving pinions. Equalisation of the drive has since been obtained by applying the primary driving gear at a point between the two faceplates.

In the early designs of the end-driven car wheel lathe, both headstocks were fixed in position on the bed; the wheels were lifted into the lathe by a crane and supported on the steel lathe centres, the centre in the outer spindle of the lathe being advanced the required amount. The journals therefore had no support except that given by the centres, and the faceplate driving bars projected in consequence a considerable distance from their brackets. The centre-pops in the axle ends at that date were small and inadequate to resist the pressure of heavy cuts, and the capacity of the lathe was not more than about seven pairs of wagon wheels in a working day.

A modification was to provide internally-coned cups attached to the spindle ends, supporting the end collars of the axles, instead of using the centres. This method could be justified only by the fact that the centre-pops in the axles were of smaller dimensions than were necessary to provide adequate support, and centres nowadays are generally made larger.

#### Some Important Advances

The next important step was the introduction of journal collets in the end-driven car wheel lathe, thus providing proper support for the axles and allowing the faceplates to come close up to the tyres, also the replacement of driving bars by short rigid friction grippers bearing direct upon the outer side face of the tyre. This involved the longitudinal movement of the outer or "loose" headstock, at first by hand lever and later by motor. A further important improvement was to dispense with the use of a crane for loading, by rolling the pair of wheels directly into the lathe at rail level. In one of the earlier American models, one saddle casting was made integral with the movable headstock, so as to allow of the wheels being rolled in from either side of the lathe if desired, but apparently this method was not much used.

A recent design of the end-driven car wheel lathe is one in which each saddle is attached to its respective headstock. This method allows of the pair of wheels being rolled in on one side and out at the other, with the minimum of longitudinal movement of the headstocks, and no longitudinal movement of the work. The multiple tooling system, consisting of a complete set of tools permanently fixed to the top slider of the saddle, is now in common use, and various contributory improvements have been made, such as separate fast traverse motors to position the tool-holders relatively to the tyre profile, and the protection of the traverse screws from dust and cuttings.

It would therefore appear that if full advantage is to be taken of the output capacity of the latest types of car wheel lathes (in which the loading and fixing of the wheels is performed very quickly) the question of handling the work as apart from the machine becomes one of considerable importance, and it is obviously easier to increase the capacity of the individual machine than for the

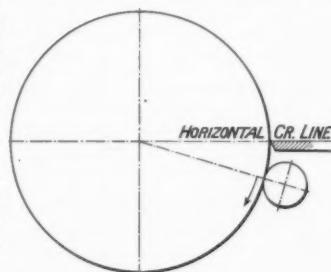


Fig. 1

management to co-ordinate the means of quick transport and handling of the work where the existing layout is restricted.

### Importance of Good Centring

Referring again to the question of the centres in the axles, particularly of coach and tender wheels, the importance of good centres has been generally recognised in recent years, and in progressive practice they have been made appreciably larger and perhaps machined more accurately in the ends of the axles. This has been found especially necessary where the work revolves on fixed centres, as in the turning operations on axles or the grinding of axle journals, although it also has considerable importance as a means of maintaining accuracy in locomotive and tender wheel lathes.

It occurs to the writer to make a suggestion in respect of the centring process, in view of the amount of wear to which centres are subjected under modern conditions of turning and grinding, *viz.*, that instead of forming the centre-pop in the axle material itself, a recess might be bored in the rough axle forging, after cutting to dead length, and a tool-steel plug already machined with the centre cone could then be driven in, and caulked over as shown in Fig. 2.

The idea is, of course, to provide a hard and durable centre to maintain register and prevent distortion, if applied in the case of coach, tender, and solid locomotive axles. It is correct to say that the distortion of axle centres has been, and is, a frequent cause of loss of time and efficiency. The centre plugs suggested could readily be made on an Automatic, in quantity, if desired. It is true that in the more recent designs of axle-turning lathes, revolving centres are used, but even so it would certainly appear to be advantageous from the point of view of accuracy to use the hard plug suggested.

This question of centres has a bearing on the use of back rests on large locomotive wheel lathes. In practice,

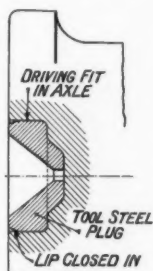


Fig. 2

if the inner faces of the tyres of a pair of engine wheels are machined by the back rests, it is sometimes difficult to match the full profile form with the turned side faces. This is always so when the lathe centres in the respective headstocks have lost their exact alignment with one another, perhaps through a slight settlement of the machine foundation, or through a distorted centre-pop in the axle, as in either case a line scribed on the tyre tread by the front tool would not coincide with a line scribed by the back tool if set at a point directly opposite to the front tool. It appears, therefore, that if back rests are fitted, they can best be used on the rough turning of the tread only and the topping of the flange, leaving all other operations to the front tools. The incidence of faulty matching with front and back rests, however, makes it generally desirable to perform all turning and facing operations with the front rests.

### Faceplate Drivers for Wheel Lathes

It may be appropriate at this point to consider some of the points which arise in connection with the methods used for securing a pair of wheels in the wheel lathe. So far as wagon and coach wheels of all sorts and tender wheels are concerned, it may be taken for granted that recent developments in design have produced satisfactory methods, whether non-automatic for small outputs or automatic for large outputs. In the case of locomotive wheels, however, there is admittedly still room for improvement. There are three methods in use, namely,

- 1.—Serrated gripping plates of the screw-jack type, bearing directly upon the outer face of the tyre. This method is not considered suitable for turning new tyres, in which the outer faces require to be machined, besides which means have to be provided to prevent undue springing of the wheels under the pressure exerted by the grippers.
- 2.—U-shaped dogs, swung into position through the spokes, and acting as a vice to grip both faces of the tyre. This is a powerful and rigid drive, but neither the outer nor the inner face of the tyre can be machined while the U-shaped vices are in position.
- 3.—Driving bars carried in brackets which are adjustable on the faceplate both radially and tangentially. Each bar is brought up against a spoke, and locked to the spoke by a V-shaped block. This system is now commonly adopted by



Wheel lathes, axle grinding and other machines in the Stratford carriage and wagon works of the L.N.E.R.

machine tool makers in this country, as it leaves the profile and the faces of the tyre free of access to the tools, and does not spring the wheels.

Assuming No. 3 to be, in general, the best arrangement, the time taken for setting, in proportion to the total time of all operations, is still too considerable an item, where it is found necessary to change the location of the driver brackets frequently, to suit larger or smaller diameter wheels as the case may be. This point has always been a drawback to output, and some quicker and easier means of changing the location of the face-plate drivers is very desirable. It is not found expedient in practice to allocate large loco. wheels to one lathe and small wheels to another.

#### Problem of Varying Wheel Design

A further point arises in this connection. In the case of several foreign and colonial railway shops particularly, where conditions of limited output call for the use of a lathe fitted with drivers suitable to deal with various diameters and different designs of engine wheels, other problems occur. Take, for instance, small diameter wheels in which approximately one-half of the area of the face of the wheel is filled up by a counterweight which is not detachable, and therefore affords no means of inserting a driving bar at the filled-in segment.

While it is possible to apply pressure dogs of the screw jack type to the face of the tyre itself, this method is not

ideal, for the reason that resistance to the pressure of the dogs necessarily varies as between A and B in Fig. 3, tending to spring the wheel unduly. Also, it is not in that case practicable to machine the outer faces of the tyres, without withdrawing the dogs and making use of bars in the available spokes only. This is a case where probably the designer of such engine wheels could come

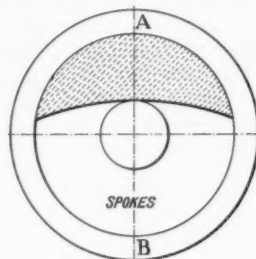


Fig. 3

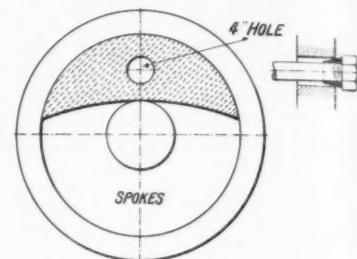


Fig. 4

to the help of the machine tool maker by modifying the counterweight so as to provide a hole of, say, 4 in. diameter in the solid segment, to receive a driving bar and conical washer as shown in Fig. 4.

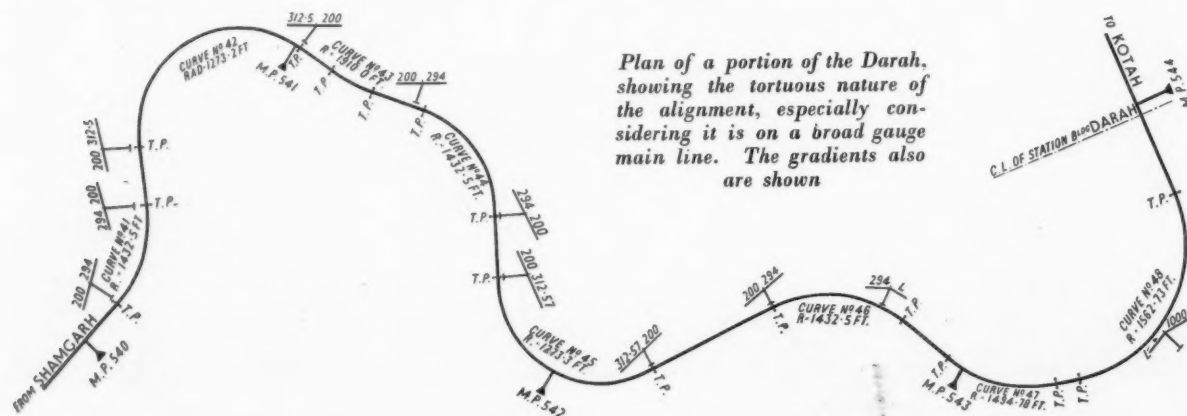
[The first article of this series appeared in our issue dated February 15.]

## THE FRONTIER MAIL AND THE DARAH, B.B. & C.I.R.

*The Darah is a heavy section of the Bombay-Delhi main line, both as to constructional works and curves. It is traversed by the fastest long-distance daily express in India*

**T**HOUGH not fast according to European or American standards, the fastest daily train in India covering a distance of over 500 miles is the Bombay, Baroda & Central India Railway Frontier Mail. In the course of its journey between Bombay and Delhi it has to negotiate the famous Darah pass near Kotah on the Nagda-Muttra section. In order to maintain the easy curves and gradients essential for the express working of heavy trains up the Darah bank, engineering works of considerable importance had to be undertaken at the time of construction, about 30 years ago. The result was the alignment, a portion of which is reproduced below.

The heaviest passenger work on this line is now allotted to the standard "X.C." engines. One of these engines at the head of the Frontier Mail is the subject of our striking illustration opposite, which also shows the topography of the country traversed and one of the stone viaducts, which, like all the buildings and other structures on the Nagda-Muttra section, is of very fine masonry work. The B.B. & C.I. "X.C.'s" differ only in detail from those illustrated and described in THE RAILWAY GAZETTE of September 15, 1933. For instance, they are about 1½ tons heavier, have a slightly lower pitched boiler and are a foot longer over buffers.

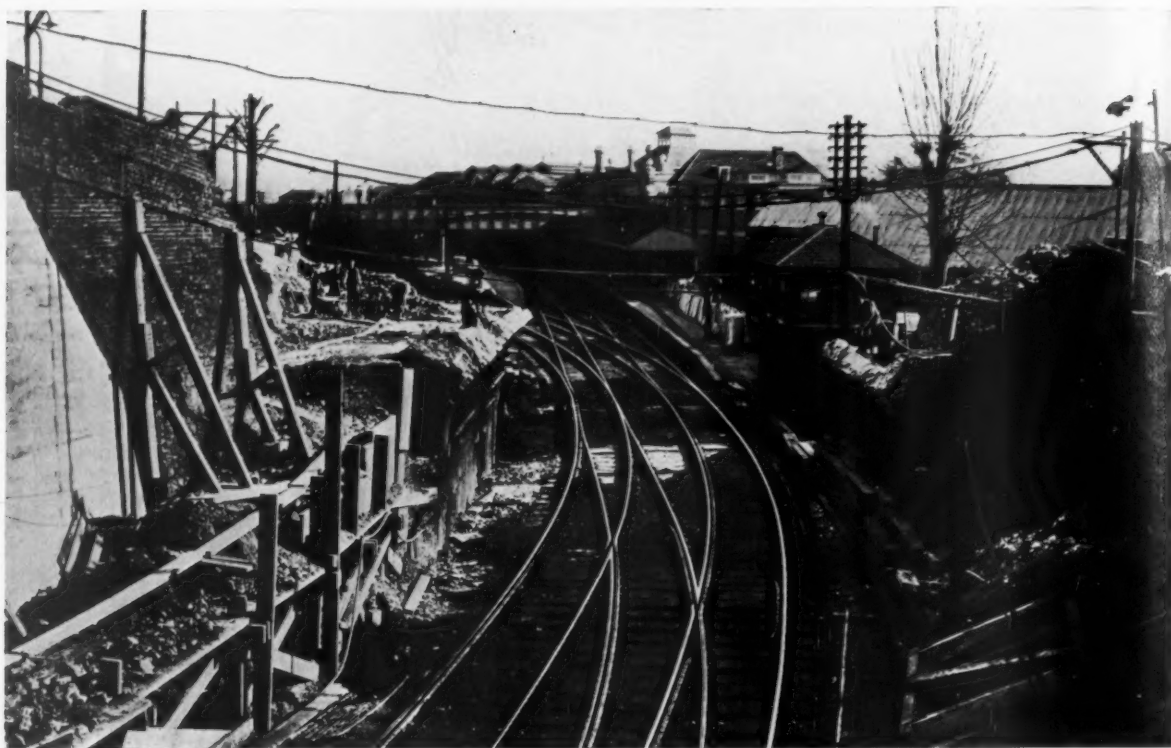


Plan of a portion of the Darah, showing the tortuous nature of the alignment, especially considering it is on a broad gauge main line. The gradients also are shown





*The Frontier Mail running over the Darah section of the Bombay, Baroda & Central India Railway main line between Bombay and Delhi. It then continues via the North Western Railway to Peshawar on the North-West Frontier, a total distance of 1,450 miles. The Darah incline is ascended to reach the Central Indian plateau near Kotah. A few details of the Darah and of the locomotives used will be found on the page opposite*



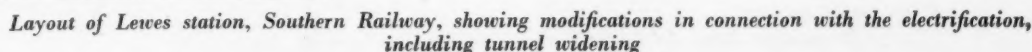
*Looking towards Lewes station from the signal gantry seen in the view below*



*Entrance to Lewes tunnel showing new sidewall for widening on the right. In the foreground are the abutments of the old Southover Road bridge. (See article opposite)*

*In connection with the electrification of the Eastbourne and Hastings main lines, alterations at Leves have been necessitated and include the delicate operation of widening the tunnel without interference with traffic*

The method adopted for widening the tunnel is indicated on the accompanying sections, which show that a new





wall has been built behind the old tunnel wall on the down side. The old arch is being taken out in 5 ft. sections and the new arch constructed, joining up a few feet beyond the crown towards the up side. Cement grout is then forced into the interstices between the lining and the chalk. Electric lighting, from the town supply, is used for the work.

To build the new tunnel wall, headings were driven from the face of the tunnel and from a point about halfway along the length to be widened. First a bottom heading was driven, then the intermediate heading, and finally the top heading, timbering being inserted between the back of the old tunnel wall and the chalk formation. The new wall was then constructed in brindle bricks in cement. The joining up of the wall to the old tunnel crown is now proceeding in sections, as already described, and the whole work is due to be finished by May, although it was begun only last October. It has been carried out without any interruption to traffic and is thus quite a notable as well as a very interesting feat of engineering, for which credit is due to Mr. George Ellson, Chief Engineer of the Southern Railway, and his staff, to whom we are indebted for the opportunity to visit the site and describe the work.

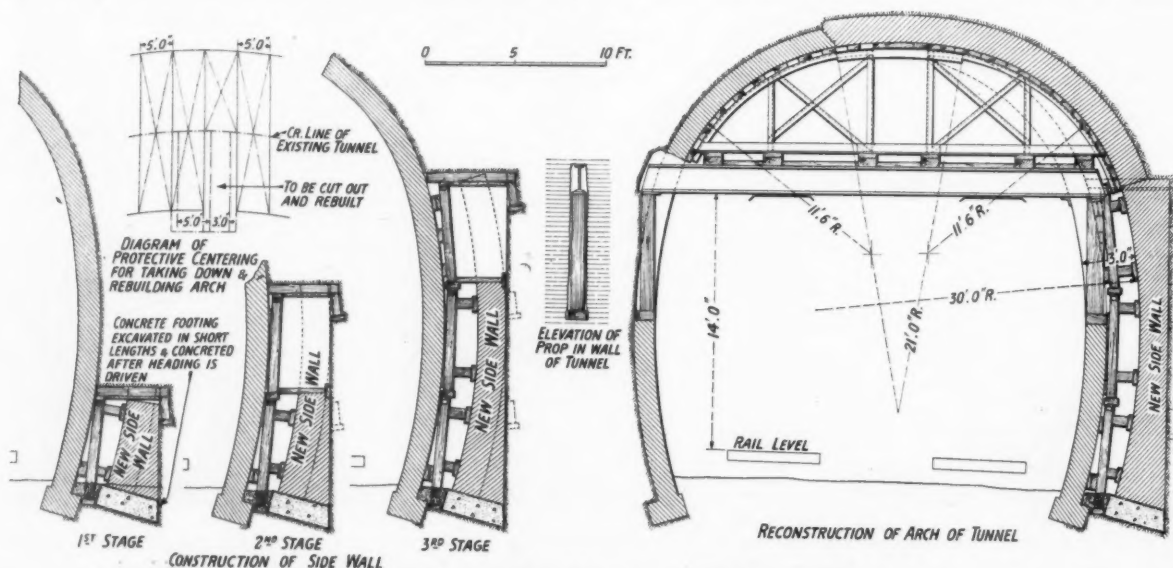
A little south of Lewes station the railway crosses the River Ouse by a bridge, the central span of which has to be raised to permit of the passage of vessels. The high-tension cables which supply the current for the electric traction cannot be laid over the bridge, and are therefore being laid beneath the river bed in concrete pipes. To enable the trench to be dug to a depth of about 3 ft. below the bed of the river, the latter is being dammed in sections and the water pumped out. The above-mentioned works are being carried out under contract by Edmund Nuttall, Son & Co. and John Mowlem & Co. (Joint) Ltd. for the tunnel work, and R. Robinson & Co. for the laying of the cable ducts under the river. The high-tension and pilot cables themselves come under the supervision of Mr. A. Raworth, Electrical Engineer for New Works, Southern Railway.

The principal other civil engineering works in connection with the electrification consist of the building of 16 sub-stations, 14 track circuit-breaker buildings, and a control room building at Ore of somewhat similar design to that at Three Bridges. A carriage cleaning shed is being erected at Ore and will have water and vacuum cleaning



*Views in tunnel showing the widened work in relation to the old*

equipment. Cooden halt is being rebuilt as a station, and at certain other stations and halts platforms are being extended, and at some footbridges erected. At Eastbourne the permanent way layout is being simplified and the signalling altered in connection therewith. The platforms here, too, are being extended. Sidings have been electrified at certain places and cleaning stages with water supplies provided for dealing with the electric stock. Signalling is being modified wherever necessary to permit of the more frequent train services under electric traction.



*Progressive stages in Lewes tunnel enlargement, Southern Railway*

## RAILWAY NEWS SECTION

### PERSONAL

Mr. John Edward Maurice Rowland, who, as announced in THE RAILWAY GAZETTE of February 22, has been appointed Agent of the Burma (State) Railways, takes over charge of his new duties today, March 1. He was educated at Dulwich College and gained his early engineering experience at workshops in Liverpool. In 1904

Mr. G. E. Cuffe, who, as announced in THE RAILWAY GAZETTE of January 4, has been appointed Agent of the Assam-Bengal Railway, was educated at Marlborough and Jesus College, Cambridge, where he obtained the Honours B.A. in Engineering in 1914. He then served with the Royal Engineers (Signals) in France from 1914-20, rising to the rank of Captain and being mentioned in despatches. In 1920 Mr.

Among the Sheriffs appointed by His Majesty in Council for the year 1935 are:—

Mr. Cyril Edward Lloyd, a Director of the Great Western Railway, for Worcestershire, and

Mr. Walter Kennedy Whigham, a Director of the London & North Eastern Railway, for Kent.

Mr. Ashley Cooper was unable to be



**Mr. J. E. M. Rowland,**  
Appointed Agent of the Burma Railways



**Mr. G. E. Cuffe, B.A.,**  
Appointed Agent of the Assam-Bengal Railway

he was appointed an Assistant Engineer on the Burma Railways and, on arrival in that country, was posted to new construction work. After varied construction and open-line experience, he was promoted to the rank of District Engineer in 1919, and ten years later became Deputy Chief Engineer. Mr. Rowland has officiated as Chief Engineer during the absence on leave of Mr. G. A. Hicks, from whom he also took over charge when the latter proceeded on leave preparatory to retirement on December 4 last. He now succeeds Mr. B. M. Crosthwaite as Agent.

Cuffe joined the London & South Western Railway as a pupil and gained extremely varied and useful experience in the Traffic, Signal Engineer's and Electrical Engineer's Departments. He went out to India as Assistant Traffic Manager of the Dibru-Sadiya Railway—which is owned by the Assam Railways & Trading Co. Ltd.—in 1923, and became Traffic Manager in 1924. It was in 1928 that he was appointed Agent & General Manager in India to the Assam Railways & Trading Company, the position he is now vacating to go to the Assam-Bengal Railway as Agent.

present at the ordinary general meeting of the Beira Railway Company, held in London on February 19, owing to his absence on a brief visit to South Africa. There he will have an opportunity of making himself fully acquainted with local conditions on the Beira system.

It is with regret that we learn of the recent death, at the advanced age of 91, of Dr. Carl Bachmann, the oldest member of the signalling industry in Germany and founder of the firm of Scheidt & Bachmann, at Rheydt, Rhineland. An outline of the firm's

history and activities will be found in our Overseas columns. Dr. Bachmann took an active part in its work down to the end of his long life, and was everywhere warmly esteemed. He liked to relate to visitors how he witnessed the Coronation procession of King Edward VII in the company of a well-known English signal engineer now deceased. His son-in-law, Rudolf Kraft, who died in 1929, was associated with him as a partner for many years, and was also known to engineers in this country.

Mr. Robert Flack, Chief Accountant, Central Argentine Railway, left Buenos Aires on January 23 for leave in England.

Sir Robert Perks, sometime Deputy Chairman of the Metropolitan District Railway, left estate valued at £74,946 (£60,750 net).

Mr. J. Montague Eddy, C.B.E., a Director of the B.A.G.S. and B.A. Western Railways, who has been on a business visit of some weeks' duration, left Buenos Aires to return to England on January 23.

Mr. Wilfred E. Gooday, who, until a few months ago, was Manager of the Technical Department of the Vacuum Oil Company, has now established himself at Brettenham House, London, W.C.2, as a consultant on lubricants and lubrication. Firms who have no specifications or specialists of their own will benefit by being able to consult him.

Mr. H. C. Charleton, J.P., is retiring this week after nearly 50 years' service on the locomotive running side of the Midland and L.M.S. Railways, since 1904 as a driver. After driving Midland expresses for 15 years, Mr. Charleton was elected M.P. for South Leeds in 1922, and retained his seat until 1931. He was Chairman of the Select Committee on Estimates (1930), Parliamentary Private Secretary to the Under Secretary for the Dominions

(1929-31) and a Junior Lord of the Treasury (1931). In addition, Mr. Charleton is a J.P. and an Alderman of the London County Council, a member of the Council of the Royal College of Music—music being one of his chief recreations—and a Governor of Queen Mary's Hospital, Roehampton.

#### G.W.R. AUDIT COMMITTEE

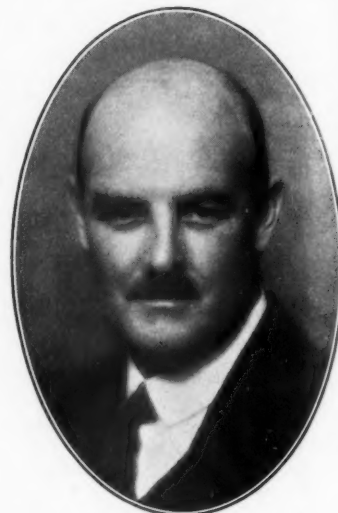
Mr. D. Rupert Phillips, and Mr. W. J. Stevens have been elected members of the Great Western Railway Company's Audit Committee, to fill vacancies caused by the deaths of Mr. John Hedges and the Rt. Hon. Viscount Tredegar. Other members of the Committee are: Sir George Lewis Barstow, K.C.B., Sir W. Edgar Horne, Bt., and Mr. Reginald J. R. Loxdale.

We regret to note the recent death of Dr. R. J. L. Sladen, F.R.C.S., D.P.H., one of the best known railway medical officers in India of late years. Dr. Sladen went out to that country in 1902 as a District Medical Officer on the G.I.P. Railway and subsequently became Principal Medical Officer of the B.N.R. and of the B. & N.W.R. before his return to the G.I.P.R. in this capacity in 1929. He left Bombay in April, 1932, upon two years' leave preparatory to retirement.

At a board meeting of the English Steel Corp. Ltd., held on February 21, Mr. F. Pickworth, the Secretary of the corporation, and Mr. A. G. E. Briggs, Sales Manager, were appointed Special Directors. Mr. Pickworth is a Director of Firth-Vickers Stainless Steels Limited, Darlington Forge Limited, and Industrial Steels Limited, and, prior to the formation of the English Steel Corp. Ltd. in 1929, was Chief Accountant of Cammell Laird & Co. Ltd. In addition to the office of Secretary he holds an executive position in the Sheffield Management of the English Steel Corp. Ltd. Mr. Briggs received his early technical training with Vickers Limited and at Sheffield University, and was later in charge of Vickers' Railway Department in

London. After a period as London Manager for Ibbotson Brothers & Co. Ltd., he rejoined the Vickers works in January, 1933, being given control of the selling activities of the corporation both at home and abroad.

Mr. Eric A. Robinson, A.M.I.Mech.E., who, as already announced in THE RAILWAY GAZETTE of February 15, has been appointed Managing Director of the Superheater Co. Ltd., London and



**Mr. Eric A. Robinson, A.M.I.Mech.E.,**

Appointed Managing Director of the Superheater Co. Ltd.

Manchester, was educated at Cheltenham College and received his practical training in the locomotive works, Crewe, L.N.W.R. After serving with the Royal Engineers for four years in France, where he was awarded the Military Cross, Mr. Robinson returned to Crewe, becoming Assistant Works Manager. In 1921 he joined his present firm, for which he has travelled extensively, visiting South Africa, South America, India, Egypt and the U.S.A. Mr. Robinson was appointed General Manager in July, 1933, a Director in September, 1934, and now, on the retirement of Lt. Col. H. A. Stenning, Managing Director.

Colonel R. E. B. Crompton, C.B., will be 90 years of age on May 31 next. A banquet has been arranged to celebrate the event—mention of which will be found in our Forthcoming Events columns—when he will be presented with a portrait of himself, which he intends to hand to the Institution of Electrical Engineers. He will, however, retain an album containing the signatures of subscribers to the cost of the portrait as a memento of the occasion.

Mr. Rang Behari Lal has been appointed to officiate as Deputy Controller of Indian Railway Accounts as from January 25.



**Mr. C. R. Byrom,**  
Chief Operating  
Manager  
L.M.S.R., bidding  
farewell to Mr.  
H. C. Charleton  
on the eve of his  
retirement



## L.M.S.R. London Goods Manager's Smoking Concert

Mr. A. L. Castleman, London District Goods Manager, L.M.S.R., presided at the London District Goods Manager's Smoking Concert at the Queen's Hall, London, last Monday evening. He was supported by various officers of the company. Those present included:—

Sir Harold Hartley, Vice-President; Mr. E. J. H. Lemon, Vice-President; Mr. Ashton Davies, Chief Commercial Manager; Mr. T. W. Royle, Chief Assistant Commercial Manager; Mr. D. C. K. McCulloch, Assistant (Goods); Mr. C. R. Byrom, Chief Operating Manager; Mr. W. A. Stanier, Chief Mechanical Engineer; Mr. C. E. Fairburn, Electrical Engineer; Mr. A. F. Bound, Signal and Telegraph Engineer; and Mr. G. H. Loftus Allen, Publicity Manager.

The whole of the Queen's Hall was filled by an enthusiastic audience. The guests included a large number of traders and officers from other railway companies. An excellent programme was arranged by the Concert Committee, of which Mr. A. H. Grose was the Chairman, Mr. R. A. Duncan the Musical Director, and Mr. R. W. Judd, Hon. Secretary.

The artists included: Garda Hall, Soprano; Linda Seymour, Contralto; Ashmoor Burch, Baritone; Arthur Askey, Humorous; Harry Brunning, Humorous; and Percy Tapp, Organist.

There were no speeches in the interval, but in the concert programme was printed the following message from Mr. Castleman:—

"The London District Goods Manager, his officers, and staff of the Commercial Department, extend a very hearty welcome to you all, and look forward with confident anticipation to the continuance of the happy relations existing between the London Midland & Scottish Railway and its clients."

## G.W.R. Operatic Society in "Jolly Roger"

Piracy in the Spanish Main during the closing years of the seventeenth century provided a colourful setting for the rollicking choruses with which "Jolly Roger" abounds. This musical burlesque was presented on five evenings last week, two at the Park Theatre, Hanwell, and three at the New Scala Theatre, W., by the G.W.R. (London) Operatic Society.

Mr. Jack Sealey was excellent as Bold Ben Blister, the hero's sailor companion, who always provides a way of escape from the machinations of the cruel Governor of Jamaica (Mr. Ronald Ratcliffe) and the Bloody Pirate (Mr. Stephen Sweeney) with whom he is in league. Mr. Baden Hawes as Jolly Roger, the hero, had ample scope for his tuneful voice in serenading Amelia (Miss Vera Busby) on every possible occasion, and her fine range of notes duly responded. Her father, Admiral of the Fleet Sir William Rowlocks, as played by Mr. David Staples, provided

one of the most convincing characters, and paired well with Amelia's companion Flora Pott (Miss Geraldine Fisher) in the tuneful "Flora and William" duet. Miss Allison Edwards (as Prudence Wary, Amelia's maid) was a charming foil to Mr. Jack Sealey's humour.

The Honorary Musical Director, Mr. Charles Gardiner, is deserving of a special word of praise for his effective but restrained conducting. The production was under the direction of Mr. George H. Hemmen.

## Churchward Memorial Ambulance Trophy

The late Mr. G. J. Churchward, for many years Chief Mechanical Engineer of the Great Western Railway, was keenly interested in the ambulance movement, and was, in fact, President of the Swindon organisation, and it is fitting that his legacies should have made a gift which has been applied to the purchase of a challenge shield to be known as the Churchward memorial trophy. The shield is offered for annual contest



among ambulance workers in the beginners' class at Swindon, and will perpetuate the memory of one whose influence and help contributed for so many years to the progress of this beneficent movement. The shield, a photograph of which is reproduced, is of ebony. Its central features are the eight-pointed cross of the Order of St. John, the four arms showing the cardinal virtues, Prudence, Temperance, Justice, and Fortitude with which they are associated. The trophy was competed for in the divisional ambulance contest at Swindon, on February 20, and was won by the Swindon works No. 5 team, captained by L. Porter,

## Anti-Friction Bearings in Railway Service

Addressing members of the Crewe Technical College Engineering Society at Crewe on February 9 on "Tapered Roller Bearings in Railway Service," Mr. J. E. Spear, of British Timken Limited, said that a record of the locomotives and railway vehicles to which tapered roller bearings had been fitted during the past two years showed conclusively that such applications had definitely passed the experimental stage and were rapidly becoming standard practice on many railways throughout the world.

The application of anti-friction bearings to railway rolling stock was not a particularly new development, as experiments were carried out in this country with ball bearing axleboxes at the beginning of the century. This was actually long before bearings of sufficient load-carrying capacity and accuracy for railway work could be produced, and it was not until shortly after the war, which had given a great impetus to the industry in connection with anti-friction bearings for road vehicles, that suitable bearings for railway work could be manufactured.

In evolving the roller bearing axlebox, Mr. Spear went on, the principal obstacles affecting the bearing design which had to be overcome were the large crushing pressures exerted by heavy loads at high speeds, severe hammer blows on the bearing surfaces, diagonal twisting and jamming of the rolls and the severely fluctuating axle end thrust which is always present.

In addition, the design had to conform to certain practical requirements which were just as important and could be summarised as: (1) Simplicity of construction and mounting; (2) durability and reliability in service; (3) low internal friction under all conditions; (4) ease of inspection and economy of operation; (5) positive and economic lubrication; (6) adjustability for any slight wear that may occur; (7) ability to negotiate both radial and thrust loads in the bearing itself; (8) complete safety at all times.

In ball bearings the loads carried were, Mr. Spear pointed out, concentrated at a few points where the balls touched the races, whereas in roller bearings the load was distributed along lines of contact between the rollers and the races. To ensure line contact, however, the rollers must be "held in line" with the axle, and this was attained by making the rollers of tapered form so that the large end bears firmly against a guiding rib on the race. Furthermore, this form of construction had the added advantages of negotiating both radial and thrust loads, or any combination of these.

The lecture was illustrated by slides showing typical examples of locomotives, fitted with anti-friction bearings, now running on various railways throughout the world.

## GREAT WESTERN RAILWAY COMPANY

*Welcome revenue recovery—Reserves and dividends—Operating efficiency—New negotiating machinery—Development works—Air services—Railway rating—Trade prospects*

The annual general meeting of the Great Western Railway Company was held at Paddington Station on Wednesday, February 27, the Rt. Hon. Sir Robert Horne, G.B.E., K.C., M.P. (Chairman of the company), presiding.

The Secretary (Mr. F. R. E. Davis) read the notice convening the meeting.

### Centenary of the Railway

The Chairman: Ladies and gentlemen, on August 31, 1835, the Great Western Railway Company was incorporated. This great organisation, of which those assembled here today are the modern representatives, is therefore within six months of completing a public service extending over the most remarkable century of human progress known to history. (hear, hear). During this epoch the company has experienced periods of vicissitude as well as of good fortune: of acute anxiety as well as serene confidence: of exasperating failure as well as encouraging success: but through all those times, good and ill, the reputation of the railway has stood high in popular favour and we are today the heirs of a system which absorbs our interest and commands our loyalty.

The time has not yet come to give an adequate narrative of the chief episodes in our dramatic history. That, I am sure, will be done when we reach the appropriate point of time. Today we are concerned only to review our fortunes during the last twelve months and to estimate, as best we may, the prospects of the immediate future. I shall assume that you have read the report, which has been in your hands for some days, and that I need not recapitulate all the items of interest contained in it. I shall rather confine myself, with your permission, to some of the salient features of our experiences in 1934 and to the developments in railway practice to which we may look forward in the year upon which we have entered.

### Directorial Changes

I must, however, begin with a reference to your directorate. In September last we sustained a great loss by the death of Mr. Laurence Currie. He had been a Director of the company for over 13 years, and for most of that time he had acted as Chairman of our Finance Committee. He was a senior member of the banking house of Messrs. Glyn Mills & Co., who have been associated with us for practically the whole of our existence, and his wide knowledge of financial matters was of great value to the board. To succeed him in the office of Chairman of the Finance Committee we have appointed Mr. Charles Hambro, who is Managing Director of Hambro's Bank, and a member of the Court of Governors of the Bank of England. The company is singularly fortunate in enjoying the advice and guidance of one who, at an early age, has already made a distinguished name for himself in the City, and the shareholders are to be congratulated on having such an excellent choice available.

The directors have decided, in accordance with the discretion you granted to us two years ago, not to fill the vacancy on the board created by Mr. Currie's death, but we have reverted to a practice previously followed by the company of having two Deputy Chairmen, and have joined Mr. Hambro to Lord Palmer, who, though he had a colleague in that office when he was first appointed, has for many years generously taken upon himself the burden of performing its duties alone.

On January 1 last, the dignity of a barony was conferred by His Majesty the King on Sir Wyndham Portal, one of our directors. Sir Wyndham has, in the past, rendered many eminent services to the country, but we remember particularly at this moment the investigation which, at the request of the Government, he made last year into con-

ditions in the depressed areas of South Wales, a region with which our fortunes are intimately concerned and with respect to which his knowledge is valuable at once to the community and to ourselves. I am sure you would wish to be associated with me in congratulating Lord Portal on the recognition which has been given to his work by his Sovereign and on his accession to the Peerage.

### Canal Charges

Before turning to the main business of the meeting I should like to refer to two formal matters with which we must deal in this assembly. The special general meeting to follow this meeting is for the submission to the proprietors, in pursuance of the Standing Orders of Parliament, of two Bills in which we are interested. The first—our own Bill—is an omnibus Bill in which we are seeking powers in respect of a number of miscellaneous matters. The only one of outstanding importance relates to canal tolls and charges which hitherto have been governed by regulations kept alive from year to year but which will expire at the end of this year. The other Bill is one which is being promoted by the proprietors of the Stourbridge Navigation, whose canal adjoins our Stourbridge Extension Canal. We have been discussing tentatively a proposal for transferring our canal to the Stourbridge Navigation, and as Parliamentary powers are required for this purpose, the necessary clauses are included in the Bill of the proprietors of the Stourbridge Navigation.

The directors share the regret which I know will be felt by the proprietors at the death of Mr. John Hedges and the Rt. Hon. Viscount Tredegar, C.B.E., who rendered valuable services on the Audit Committee. Mr. D. Rupert Phillips, who is prominently connected with the industries in South Wales, and Mr. W. J. Stevens, who is too well known to you to need any introduction from me, have been nominated to fill their places and a resolution dealing with the matter will be submitted to you later on in the meeting.

I now ask your attention to the accounts. You have doubtless studied with interest the financial results of the year, as shown in the accounts, and I shall not do more than indicate the prominent items in them. Our capital expenditure during the year amounted to £1,180,623. Investments in Carter Paterson & Co. Ltd. and Hays Wharf Cartage Co. Ltd. (which controls Pickfords Limited), come into the capital account this year for the first time. It is interesting to note that the sums which we have invested in recent years in road transport companies such as those mentioned above, and in associated omnibus companies, yield us an average return of approximately 6 per cent., in addition to which we have obtained many advantages from mutual co-operation.

### Improvement in Revenue

There has been a welcome recovery in practically all sources of revenue, and receipts were up by £856,726, as compared with the previous year. This increase reflects a general improvement in trade and spending power, but it was offset, as you would expect, to the extent of £340,638—or 40 per cent.—by an increase in expenditure. This low ratio of expenditure to receipts is, however, very satisfactory, and indicates that we are now reaping the benefit of the sums which we have disbursed during the past few years in improving our facilities for the handling of traffic. Perhaps the best indication of what has been done in this direction is to be found in the fact that while the goods train miles run in 1934 increased by over 4 per cent. and the passenger train miles by nearly 3 per cent., the increase in operating expenditure was only 1½ per cent. (Applause).



There was, in fact, a marked advance in our general operating efficiency: the average mileage run daily per engine was higher than in any previous year, whilst the consumption of coal per engine mile was the lowest on record.

#### Effective Reduction in Costs

The total expenditure for the year was £24,311,381, and you will appreciate the effective efforts which have been made to reduce costs if you turn your minds back to the year 1932, in which the gross receipts were less by £818,039, but the expenditure was actually £118,910 more than last year. In the result, the net revenue for last year in respect of the whole undertaking was the best since 1931, and shows an increase of £582,438 over 1933. We have, moreover, been able to augment this sum by a profit accruing from the realisation of investments, and an amount of £323,948 has been brought into revenue account from this source.

Furthermore, the Contingency Fund which at the beginning of the year stood at £1,822,057 has been supplemented by appropriations from reserves—mainly in respect of income tax—which are no longer required, and although a sum of £550,000 has been transferred from this fund to meet the dividend which we propose, the net effect is that the fund has been restored virtually to the same level at which it stood at the commencement of the year. With the £40,679 which was brought forward, the total net revenue is thus brought up to £6,325,626. This is sufficient to enable the dividend on the ordinary stock for the whole year to be made up to 3 per cent., after providing for interest and dividends on the prior charge stocks, and leaves £43,226 to be carried forward to the next year's account.

#### The Ordinary Dividend

Full provision has again been made out of revenue for renewals and other liabilities; the undertaking has been fully and efficiently maintained; our reserves for all purposes remain at a high figure; and as the trade outlook continues satisfactory the board, after considering the position in all its aspects, felt that the ordinary stockholders could legitimately be given the benefit of the sum available as shown in the net revenue account. We accordingly decided that we were justified in recommending the payment of a dividend of 2½ per cent. on the ordinary stock for the second half of the year.

It may interest you to know that the company has paid a dividend on its ordinary stock continuously since 1870, when the various stocks were consolidated, and for this long period of 65 years the rate has never been less than 3 per cent. (Applause.)

#### Restoring Wage Cuts

The improvement in business which took place during the past year resulted, not unnaturally perhaps, in urgent representations being made to us by the trade unions representing the staff, for the restoration of the deduction from salaries and wages, which had been in operation since 1931. Numerous discussions took place, and all aspects of the question were fully considered. It has to be kept in mind that the maintenance of the goodwill and co-operation of the staff is an essential feature in the working of any large undertaking—(hear, hear and applause)—and in our own case I cannot pay too high a tribute to the assistance which we receive from the staff in this respect. While, therefore, the managements rightly pointed out that although there had been an improvement in the financial position of the railways, the net revenues were still far below the level of 1931, there remained the fact that the pay-cuts of those engaged in Government service had been partially restored, notwithstanding that the burden of the income tax payer was still heavier than at the date when the deductions were originally made. There was the further formidable factor that other large employing organisations in many parts of the country had followed the example of the Government.

In the end the demands of the railwaymen were conceded in part, and your board are satisfied that the course which was taken was, on the long view, in the best interests of the railway companies. As a gesture of goodwill, I have

no hesitation in saying that it is appreciated by the staff and I feel sure that they will lose no opportunity of continuing their efforts to make our services even more attractive to the public, and so enable the company to obtain its full share of benefit from trade revival. The concession granted by the railway companies—there is a good deal of misapprehension about this matter—was the restoration of 1½ per cent. of the then existing deduction of 5 per cent. in respect of wages in excess of 40s. per week and earnings over £100 per annum, as from the first full pay following October 1 last, with a further return of another 1½ per cent. as from the first full pay following January 1 last, the deduction now in force being still at the rate of 2½ per cent.

#### New Machinery for Settlement of Differences

The negotiations which took place during the year with the trade unions for the establishment of new machinery (to take the place of the National and Central Wages Boards) for the settlement of differences between railway companies and their employees concerning hours of duty, rates of pay, and kindred questions, were conducted with the earnest desire on both sides to secure a better and more expeditious mode of procedure, and I am glad to say that the discussions have resulted in a new scheme being devised which has now been approved by all parties. The experience of recent years made it evident that the National Wages Board—consisting of seventeen members—which was established under the Railways Act, 1921, was unwieldy. Moreover, representatives of the contending parties were virtually put in the position of judges to decide on their own claims, and much valuable time was lost through comparatively minor issues being referred to the board.

The new scheme provides for the institution of a Railway Staff National Tribunal, to consist of an independent Chairman and two independent members appointed from panels previously set up by the companies and the railway unions respectively. It will deal only with matters of major importance and will be assisted by not more than six assessors, nominated by the parties who, of course, will take no part in the actual decisions. These, although not legally binding, will no doubt be generally accepted in practice. Provision is also made for disposing of minor matters without invoking the National Tribunal. I think it may safely be said that the new machinery is regarded by all the parties who have negotiated it as being a great improvement on the old National Wages Board, and that they will heartily co-operate in order to ensure that it will work smoothly. Its institution may well prove to be the most notable railway event of 1934.

#### Development Works

I now venture to direct your attention to matters which affect our individual interests apart from the other companies. During the year the reconstruction of Cardiff General Station and the quadrupling of the line between Dr. Day's Bridge Junction and South Wales Junction, Bristol, were completed. Considerable progress was also made with the reconstruction of Temple Meads station, Bristol, and the modernisation of appliances and other improvements at our docks in South Wales. We anticipate that the schemes last mentioned will be finished this year, and this will complete the extensive programme of new works, comprising forty schemes in all, which we undertook by arrangement with His Majesty's Government under the Development (Loan Guarantees and Grants) Act, 1929. You may remember that as our liquid reserves were sufficient to enable us to finance the works for ourselves, the assistance given to us by the Government took the form of a grant of interest over a period not exceeding fifteen years on the capital which we expended. As the schemes were carried out during a time of acute depression we were able to assist very greatly in the relief of unemployment, and many of the traders on our system benefited through the contracts which we were able to place with them. The works were carried out with much less dislocation of traffic than would have been the case under more normal conditions. The schemes actually submitted to and approved by His Majesty's



Government do not exhaust all those which we have in contemplation. It is essential in a large undertaking like ours to look ahead and plan for future developments, and there are many other works which we should like to undertake if times were more propitious. The assistance formerly given by the Government is, however, no longer available, and in present circumstances it would be uneconomical to lose the interest on our funds during the long period which must elapse before large new works become fully remunerative.

In my view the carrying out of such works is one of the best ways by which unemployment can be relieved, and has fully justified the encouragement given by the Government to the railway companies to undertake them. They are strictly controlled and efficiently supervised; there is no wasteful expenditure; and the contribution by the Government of a portion of the interest on the capital expended is of meagre amount compared with the saving on unemployment benefit or public assistance. While I recognise that there must necessarily be limits to what can be attempted in this direction, I am satisfied that a good deal more could be done towards assisting production and employment in this manner if the Government would in some measure revive its previous policy.

#### Air Services

Now I turn to the subject of air services. I told you at our last general meeting of the negotiations which the four main line railway companies were conducting with Imperial Airways, Limited, for the formation of an independent company to develop air routes in conjunction with existing air and rail services, and a company of the kind contemplated was formed in March last under the name of Railway Air Services, Limited. The route which we commenced to operate in 1933 between Plymouth and Birmingham via Cardiff was extended last year to Liverpool to connect with other air services, and jointly with the Southern Railway Company a new route was opened between Birmingham and Southampton via Bristol. The first air excursion was run in July last from Plymouth to Cardiff. Within the last few weeks we have concluded, in conjunction with the Southern Railway Company, an arrangement for giving us an interest in the air service between England and the Channel Islands, a route which is already very popular, and which will become more attractive when the landing facilities at Jersey and Guernsey have been improved. Plans for further extension of this mode of travel are now under consideration and although some time must elapse before the air section of our business becomes a paying proposition, we are planning well ahead so as to ensure that we shall obtain our full share of this form of transport. You will be interested to know that although the mileage of the air services operated in our territory during the year was more than 50 per cent. in excess of the previous year, the loss on working was reduced from £6,526 to £5,150.

#### Rating of Railway Undertakings

A subject which has received great attention in recent weeks, and is, indeed, a considerable factor in your fortunes, is the rating of railway undertakings. After repeated representations to the Government by the railway companies to give effect to the recommendations made by the Royal Commission on Local Taxation in 1901 that, following the Scottish practice, each railway should be valued as a whole, Parliament passed in 1930 the Railways (Valuation for Rating) Act, which set up a body known as the Railway Assessment Authority, whose duty it is to determine quinquennially the annual value of railways for rating purposes. The practice in England and Wales before the war was to make a parochial valuation of the railway upon an estimate of the receipts and expenses of each section, and the points at issue were dealt with by numerous assessment committees and quarter sessions. The effect of this separate sectional valuation by various authorities and tribunals was that the sum of the assessments never accorded with the value of the undertaking calculated as a whole, and indeed it was almost bound to be in excess of it. The Act of 1930

directed the valuation of each railway to be made with regard to the whole undertaking on the basis of net receipts, and to be subsequently apportioned amongst the rating areas concerned.

#### Southern Railway Case

The Railway Assessment Authority lately published draft valuation rolls for the four group companies, and the Metropolitan Company, and in each case they proposed a substantial increase over the previous figures, although the companies contend that there should be very large reductions. In the case of the Southern Railway Company, the valuation roll was completed by the Railway Assessment Authority, and thereupon that company appealed to the Railway and Canal Commissioners, who after a hearing which lasted sixteen days decided that the figures of the Railway Assessment Authority should be reduced by about 50 per cent. While the Commissioners in their judgment laid down certain principles which are of general application, they stated that each case must necessarily depend upon its own facts. Nevertheless enough has already emerged to justify the contention which the railway companies have long maintained that their undertakings have been greatly over-valued for rating purposes.

At the moment the Great Western Valuation Roll is still in draft, the provisional net annual value being estimated at £2,800,000. We are now waiting to know what course the Assessment Authority propose to take in view of the judgment in the Southern Railway Company's appeal. The aggregate of the existing assessments of the Great Western Railway stands at £2,310,000, but on the basis laid down in the case referred to the net annual value of the undertaking should not differ greatly from that of the Southern Company, which the Court of the Railway and Canal Commissioners found to be £1,077,131. After these first valuations are finally settled, they take effect from April 1, 1931, to March 31, 1936, when the second valuation is intended to be completed, and there is, therefore, a period of four years in respect of which repayment of rates will have to be made, if the judgment of the Commissioners remains unchallenged or on appeal is sustained. In the present position of the matter it is not worth while to adventure any estimate of the sum which would be recoverable by the Great Western Company in respect of over-assessment during the past four years or of the amount by which our future annual payment for local rates ought to be reduced; but as the railway companies have long been urging that their payments for local rates were far in excess of what is reasonable, it is at least gratifying to know that this view has so far been endorsed by the competent Court. One does not think it worth while at the present moment to go into any question of figures, but it is quite obvious that it will make a very considerable difference to our fortunes if this judgment is upheld.

#### Passenger Services

I now turn to passenger services. The number of passengers carried by us in 1934, exclusive of season ticket holders, showed an increase of over 2½ millions, and the introduction of third class return tickets at 1d. per mile throughout the whole year was no doubt the factor mainly responsible for this increase. Our gross receipts from passengers improved to the extent of £90,000, but we had to run over 1 million more train miles to secure this additional revenue, and I am afraid the cost of this increased running and other incidental expenses fully offset the increase in the gross receipts and that a much more substantial augmentation in the number of passengers is necessary before we obtain any material benefit. On the whole, however, we are satisfied that the experimental introduction of cheap monthly return tickets has been justified, and we propose, therefore, to continue their issue. From January 1 last tourist tickets have also been reduced in price, and with a view to stimulating first class travel the fares for first class monthly return tickets have further been reduced to 1½d. per mile, the same rate as is charged for ordinary third class tickets.

The reservation in advance of seats on express trains is becoming increasingly popular, and last year we added to

the number of trains on which advantage may be taken of this facility, with the result that a record number of 350,000 passengers availed themselves of this service. The number of cheap holiday season tickets issued increased by over 50 per cent. This facility, and the evening excursions which are run at exceptionally low fares, are innovations which are being well patronised by the public. So also are the camping coaches which we station at selected sites on the system and let out on hire at moderate rates.

### Diesel Railcars

Now I wish to refer to diesel cars. The experiments which I told you last year we were making with a stream-lined diesel car on local services where the traffic is not of sufficient volume to justify the running of an ordinary train, or even a steam railcar, have proved quite satisfactory. This type of car can be operated by one man and has a greater carrying capacity than a steam railcar, as the whole of the engine equipment is fitted beneath the floor of the vehicle. It is a device which we owe to the ingenuity of our own engineer. Having demonstrated their advantages, we expanded the idea, and tried them on fast services worked under similar circumstances. For this purpose three cars of more powerful type and complete with buffets and lavatories were provided, and they have been running between Birmingham and Cardiff at an average speed of 50 miles per hour, the overall time for the journey being 2 hours 23 minutes, a saving of 34 minutes compared with the previous best service between these points. We look upon the cars as having great potentialities in certain directions, and while, as we anticipated, certain initial defects in design were revealed, these, I am glad to say, have been put right, and we recently placed an order for a further ten cars, which we propose to utilise mainly for augmenting existing services.

### Freight Traffic

As to goods traffic, the freight traffic which was conveyed over the system in 1934 amounted to 64½ million tons, an increase of 3 million tons over the previous year. Although the improvement was gratifying, the tonnage was still about 17 million tons below the level of 1929, of which coal traffic accounts for about 12½ million tons, and heavy mineral traffic for about 3 million tons. South Wales is still the centre in which depression in the coal industry is most severe. In 1913 South Wales contributed over 20 per cent. to the output of coal in this country, but by 1929 this percentage had fallen to 18.8, by 1933 to 16.99 per cent., and for last year it was only 16.39 per cent. These figures demonstrate the strong claim which South Wales has for receiving first consideration by His Majesty's Government when negotiating trade agreements with foreign countries.

During 1934 there were a few cases in which our shipments from the Bristol Channel Ports to other countries showed an improvement, but generally they still remain a long way below the level of 1929, which was by no means a peak year. Our shipments to France last year declined by a further 375,000 tons and totalled only 4½ million tons compared with over 7 million tons in 1929. In that year we shipped 450,000 tons to Belgium, but last year the figure dropped to under 42,000 tons. The comparative figures for Italy were 2,182,000 tons in 1934 against 3,153,000 tons in 1929, and for the Argentine 1,565,000 tons compared with 2,429,000 tons.

Although the recent decree issued by the Italian Government—the precise effect of which we do not yet know—is a cause of disquiet, the prospect is becoming brighter in some directions, and we are entitled to anticipate considerable benefit from the agreement recently made between South Wales coal interests and those of Poland in regard to markets and prices. South Wales is also indebted to the Secretary of State for the Dominions for the stipulation which he recently made on behalf of British coal in the arrangement which he negotiated with the Irish Free State for reciprocal trade. This should secure a substantial export tonnage for the South Wales market.

### Iron and Steel

The considerable improvement which has taken place in the iron and steel industry is the most cheering incident so far as our heavy mineral traffic is concerned. The tonnage of iron and steel traffic originating on our system shows an increase of over 800,000 tons, and when the works at Cardiff of the British (Guest Keen Baldwins) Iron & Steel Company are complete, there should be a still larger increase. At the present time, the tonnage of iron and steel traffic moving over the Great Western Railway is still about one and a half million tons below the level of 1929, but I am hopeful that we may be able to recover an appreciable part of this decrease.

Then there is a matter to which I wish to refer about a new system of charges which is interesting. The powers which we obtained under the Rail and Road Traffic Act, 1933, enabling us with the consent of the Railway Rates Tribunal to make agreed composite charges with traders for the carriage of their merchandise have given us considerable assistance in meeting road competition. Traders are rapidly availing themselves of the advantageous arrangements which we are now able to make with them, and a very large number of applications for new rates are now under consideration. Each case requires, of course, much preliminary investigation before an appropriate agreed rate can be arrived at, but already we have secured a large volume of traffic which we had previously lost to the road, and when the new arrangements become fully operative we are confident that still more traffic will revert to the railways.

### New Factories and Sidings

The number of new factories established on our system in the year under review was seventy-five. They included Messrs. Guinness's new premises at Park Royal and a new factory for Imperial Chemical Industries at Greenford. The London area seems to be exceptionally popular with those contemplating the establishment of new industries and new factories, and whilst we are glad to see these signs of industrial development, I think that viewed from the standpoint of the country as a whole, it would be much better if the distribution of these new works could be spread over a wider area, always providing, of course, that they adhered to our line! During the year we provided new sidings for twenty firms, while nine others which were out of use have been reopened. Our records show an increase of 100 per cent. in registered consignments, for which a special fee of 2s. 6d. is charged in order to ensure delivery within a specified time, and a further increase of £37,000 in our receipts from container traffic. This last mode of transport, together with the facilities which we offer for the distribution of goods from railhead by lorry services proves more popular each year. Other innovations recently adopted include a railway C.O.D. service for consignments not exceeding £40 in value and an arrangement whereby we undertake on behalf of traders to supply their goods to local customers from stocks held at our stations.

### Dock Business

The figures in respect of the docks portion of our undertaking, although better than those for 1933, are still very disappointing; the receipts show a slight increase of £2,600, and expenditure a reduction of £20,000. The improvement, though small, is very welcome, as it indicates that the steady decline experienced since 1929 has been checked. The gross receipts last year amounted to £1,974,000, which is £1,112,000, or 36 per cent., less than in 1929, and although nearly two-thirds of this loss has been offset by savings in expenses, the fall in net receipts from £543,000 to £289,000 is a matter which we cannot but view with grave concern. The return on the very large capital expended on our docks is only about ½ per cent. Moreover, the gross receipts for the past two years from the docks at Newport, Cardiff and Penarth have not been sufficient to cover working expenses.

The decline in the export of coal from South Wales ports, to which I have already made reference, is the principal cause of this unsatisfactory state of affairs. Any commercial



company with works at centres in close proximity to each other would, if faced with such a condition of things, close some of them, and concentrate the business at the remainder. In this respect we have not the same freedom of action as other commercial concerns, although we are expected to conduct our business on a sound financial basis. If we had been able to close temporarily some of the docks in South Wales we could no doubt have handled the whole of the traffic dealt with last year quite satisfactorily and more economically, but we could not adopt this course without Parliamentary sanction; neither could we expect to obtain any local support for such a proposal. We can only hope that the efforts which are being made to stimulate international trade will meet with early success, and let the unequalled steam coals of South Wales resume their merited place in the world's markets.

In closing this review of our operations, I am sure you would desire me to express in your name and my own our thanks to the officers and staff for their unremitting and assiduous service during the year. They have established a notable reputation for courtesy and efficiency, which they never cease to maintain and even enhance. (Applause).

### Prospects

And now what are our prospects in the year on which we have just entered? The first returns of our traffics in some weeks of January and February are somewhat disappointing; although in the aggregate not so disappointing; which warns us that we must not expect a continuous rise in our receipts in every week over the corresponding period of last year. We shall undoubtedly have fluctuations. But, although we must be cautious in our estimates and guard ourselves against undue expectations, there are certain factors which should have hopeful influences on our prospects.

### Trade Possibilities

Britain's internal trade has made a notable advance in recent times. Industrial output increased in 1934 by 12 per cent. over 1933, and in the manufacturing industries alone it reached the highest figure ever recorded, being  $1\frac{1}{2}$  per cent. greater than in 1929—a very startling fact which is unknown to most people. Although our exports showed a substantial increase over the year, most of the increased output was absorbed within our own country. Can our internal market continue to expand, or has it reached what is called saturation point? I am of opinion that there is still considerable room for expansion, and, provided that we remain calm and steadfast and do not give way to silly panics, the financial position is so sound and there is so much work to be done in this country, that it should be some time before we have reached the limit of our immediate development. If this be so, there should be increased traffics for the railways. The new Government housing scheme, with all that it involves to a multiplicity of other industries, should itself bring increasing trade and added demands on transport. The revival in the iron and steel trade and the extension of works in South Wales should increase our freights in that area. And although the Italian market may be disappointing, it is permissible to hope for a brightening of the export trade in coal through the Polish and Irish agreements to which I have already referred, with a beneficial effect on our dock receipts.

Our passenger receipts also will probably receive some augmentation from the movements created by the celebrations in connection with the King's Jubilee. Altogether, rightly or wrongly, I am inclined to confront 1935 with rising hope and increasing confidence. In any case, that is the spirit in which we should go forward to our tasks. We shall achieve nothing if we fumble in fear or harass ourselves with apprehensions. This is a great historic year—alike for us and for the whole vast community of British citizens in every part of the world. Let us greet it with joy and courage. (Applause).

I now beg to move that the report of the directors and statement of accounts for the year ended December 31, 1934, be received and adopted. I shall ask Lord Palmer to second this resolution. Before putting it to the meeting, I shall give the usual opportunity for any questions to be

asked or comments to be made by stockholders at the meeting. I beg to move the resolution.

Lord Palmer: I have much pleasure in seconding that resolution.

The Chairman: Now, ladies and gentlemen, I will call upon Colonel Hilder.

### Shareholders' Remarks

Colonel Hilder wished to thank the Chairman for his very able and informative address. He felt that at last the company was on the right road which should lead to prosperity and larger dividends, and on behalf of the British Railway Stockholders' Union he expressed thanks for the way in which their criticisms had been met. But, he continued, there is still the complaint from many stockholders that they are unable to attend these meetings except at considerable cost. We are not asking for free passes. We are only asking that you should treat stockholders on the same basis as those attending conferences, cup-ties and possibly trade shows. The resolution which I propose to put at the end of the meeting is as follows:—"That any stockholder qualified as a proprietor to attend and vote at the annual general meeting of the company shall be entitled, on the occasion of the meeting, to a return ticket at the same cheap fares as are granted to members of the public attending public gatherings, conferences and the like, and that the General Manager be requested to arrange for the necessary interchange of facilities with the other British railway companies." They have to be *bona fide* shareholders of the company for a certain period.

Mr. Leslie Boyce said there were one or two matters to which he would like to refer rather briefly. The first was the reactions of Government policy in so far as they affected the railways. He had made a comparison between the years 1932 and 1934 with a view to ascertaining the effect of the duties on imported iron and steel, and the general fiscal policy of the Government upon certain of the heavier classes of railway traffic. During the period in question the retained imports of steel were reduced by 220,000 tons, or 18 per cent., while the exports of steel were increased by 363,000 tons, or 20 per cent., and the home consumption was increased by 3,014,000, or 60 per cent. When a ton of steel was imported into the country the railways benefited by the haulage of 1 ton only from the port of arrival to the place of destination, but when a ton of steel was made in this country it involved the haulage by the railways of 3 to 4 tons of coal, 2 to 3 tons of iron ore and half a ton of limestone—that is for each ton of steel that is made. According to reliable estimates, 1 ton of home-made steel involved the haulage of 7 tons of material plus the haulage of 1 ton of the finished product, equalling 8 tons against only 1 ton involved in the haulage of the foreign article. On this basis the present fiscal policy appeared to have resulted in a loss of haulage to the railways of 220,000 tons of foreign imported steel, taken over these years from 1932 to 1934, but against this loss the railways had gained the haulage of 363,000 tons of additional exports and 3,014,000 tons of increased steel for home consumption plus the haulage of nearly 24 million tons of materials. Taking a most conservative view of those figures and allowing only 5 tons instead of 7 tons of material for the manufacture of a ton of steel—that is to say, allowing for economies, &c.—the increased haulage of materials alone which had resulted from the present policy had been nearly 17 million tons accruing to the railways.

But the point he wished to make was that, despite these figures, there had recently been a striking increase in the volume of imported steel, and he urged the stockholders to identify themselves with the efforts which were now being made to give British manufacturers as much as possible of their orders for steel, with the consequent benefit to British railways and others, particularly in the depressed mining areas.

One other matter which he wished to mention was the agreement between the railway companies and the railway trade unions for the partial restoration of cuts in salaries and wages. The railway management had been subjected to a good deal of adverse public criticism as the result of this agreement, but he very warmly welcomed that agree-



ment, and was convinced that it was both just and wise. For several years he had travelled regularly about 500 miles a week on the company's system, and he knew many of the company's employees intimately. They were all playing their part and playing it very well in rehabilitating the fortunes of the company, and he could say without fear of contradiction at this or any other meeting that there was no organisation in the country with a finer, more efficient, or more loyal body of men or a body of men who were more considerate and more courteous to the public than was to be found in the service of the Great Western Railway Company.

Mr. Jarvis desired to bring to the notice of the meeting some of the difficulties which the company was experiencing in securing additional traffic, and said that the system of agreed charges was not being adequately employed as a weapon in securing traffic from the roads.

Mr. J. J. Anthony referred again to the canal question, and asked whether the company was likely to benefit financially by the Bill mentioned in the report. He also criticised the horses and cartage vehicles used by the company on certain parts of the system, and referred to the efforts which as a shareholder he was making to secure for the company traffic previously lost to the road.

Mr. Ashley Brown recognised that during the last twelve months the company had held its own and had even regained a little of the territory that had been lost during previous years. That was very satisfactory as far as it went. The establishment of the Wages Tribunal was certainly a matter on which they could congratulate their directors and officers and also equally themselves. They were very glad that the very hopeful and encouraging experiment with diesel cars was going forward. They felt that the time had come when the State should do something to bring all charges for freight rates into some kind of unity throughout the country. Railway charges at the present moment were regulated, but that was not the case with a great many other transport concerns.

Mr. Ashley Brown also referred to Mr. Lloyd George's suggestion that all the railways in the country should be electrified, and said there was a growing tendency on the part of politicians to regard the railway companies as a convenient asset for the furtherance of political propaganda. He thought the stockholders should take the line that the only people with the right to give decisions were the stockholders, by whom the railways were owned.

Mr. E. H. Greg, referring to the question of manufacture of rolling stock in the company's own works, said that if some of this work could be given out it would be a great encouragement and help to the rolling stock manufacturers, and would also help them to cover their overhead charges, and thereby put them in a better position to compete for export trade. He also commented on the cost of the railway company doing this work itself.

Colonel Rees Mogg thought that £76,000 was an enormous sum to pay for loss of and damage to goods. He was told by big firms that the reason they did not send things by railway was on account of the enormous losses in breakages, so this loss of £76,000 a year did not represent nearly the loss to the railways.

Mr. Butler: Mr. Chairman, you mentioned in your speech the increased receipts which this company hopes to get from the Polish and other agreements. Can you kindly tell us whether those increased receipts on the one hand will also carry reduced receipts on the other hand in respect of the carriage of agricultural produce, from which the railway companies also derive revenue?

#### Chairman's Reply

The CHAIRMAN: Now, ladies and gentlemen, I should be very glad to answer the questions which have been put to me. Dealing first with Mr. Butler's inquiry, let me say this, that the effort of the Government under our present conditions is to balance our trade to the best advantage. There is a very active Minister for Agriculture who, in all these agreements, is most assiduous in taking care that the agriculture of this country does not suffer, and I have not the slightest doubt that in framing the Polish agreement, in which all departments are concerned, very scrupulous care

was taken to safeguard the position which the gentleman who has just spoken has mentioned.

Now with regard to the question Colonel Rees Mogg raised with reference to the amount of damage which takes place in consignments on the line, I do not dispute at all that the figure is somewhat large, and, in fact, commented on it myself. The staff are urged to take great care to prevent damage arising, and the matter is being given assiduous attention.

I now turn to Mr. Greg's queries. I do not wish to go into figures publicly with regard to our costs in engine-building, but he may take it that the estimates which he has made in this respect are very wide of the mark. On the more general matter of placing orders for wagons and locomotives outside our own works, I think that our shareholders will recognise that there is a point of balance which has to be very carefully considered in that matter. On the one hand, we are always very anxious to help the trade of those people who are manufacturing upon our line, not merely because we like to see them prosperous from a sentimental point of view, but because it means more trade and better freights on our railways. On the other hand, we have our own shops which can quite well undertake some of the work economically, and whenever we have surplus orders, we are not only glad, but are very anxious, to place these with the outside shops, as we did only a very short time ago.

Mr. Ashley Brown, in addition to dealing with the matter of travel facilities for the shareholders attending the annual meeting—a question with which I will deal later—raised the point as to uniformity of rates as between road and rail. I am sure he recognises that, however desirable the attainment of some such uniformity may be, the difficulties attaching to this question are almost unlimited. If you think of the number of different classes of vehicles that are on the road and the number of various people that are involved, you can see immediately that you are not dealing with systems where you can readily collect a coherent opinion and get arrangements made. I can, however, tell him that this question has not been lost sight of; and I understand that the Minister of Transport has indicated his intention to make a reference to the Transport Advisory Committee with regard to the question.

Now, with regard to my friend Mr. Anthony, he sings us two songs every year, about horses and about canals; but we are always glad to hear him. The matter of horses has been very carefully looked into, but I am afraid the company does not agree with his views. On the question of canals, may I tell him at once that the object of the Stourbridge Navigation Bill to which reference has been made, is to enable us to come to terms for the transfer of our Stourbridge Extension Canal to the Stourbridge Navigation Company. We are under a statutory obligation to maintain these canals and cannot get rid of it except by the consent of Parliament.

Mr. Jarvis raised a question about the operation of the composite schemes which, as I said in my speech, have proved very valuable to us, enabling us to recapture some of the traffic diverted to the roads. He seemed to think we were being obstructed in that matter at the present time, and that we ought to be able to do more. The real fact is that there are many applications for similar arrangements, but every one of the schemes has to be submitted to a Tribunal, and the Tribunal can, of course, deal with them in batches.

Mr. Leslie Boyce made a very interesting speech. I am sure that you will take to heart his remarks with reference to the steel trade of our own country, and I am glad to think that he approves so heartily of the action which we took in connection with the application of the trade unions for a reduction in the amount of the cuts which had been previously imposed.

Now, ladies and gentlemen, I come to the question of the cheaper facilities for shareholders to attend these meetings. I need scarcely say that I have every sympathy with the shareholder whose desire to come to these meetings is thwarted by expense, and there is nothing I would so much like to see as the largest possible body of shareholders. I

am afraid, however, that the idea is not one which can very easily be carried out, because it would require several halls as large as the Albert Hall to contain the shareholders, if only a fair percentage of them decided to come. The precedents of the past to which Col. Hilder alluded were established under very different conditions to those now prevailing, and even they did not work very creditably. It is quite obvious to everybody that the scheme must entirely break down unless all the railway companies could be got to agree. You cannot restrict cheap fare facilities to the shareholders who happen to live on our own line, and thereby give them that benefit over shareholders living on other systems. Therefore, it is only by agreement of all the railway companies that you could make any such plan. I think I can say quite frankly to this meeting that the General Managers of all the companies are against the plan, and for many practical reasons which I need not go into now. Let me remind you also that the fare at which you can travel to these meetings now is single fare and a third for the return journey, and, that if any eight people congregate together to form a small party to come to the meeting, they can already get the conference rate to which Colonel Hilder referred. Accordingly, ladies and gentlemen, I would venture to say to you that we here all think, after considering the matter very carefully, however desirable the motion may appear to be to the shareholders, there are other points of view from which it becomes impracticable, and I hope you will bear this in mind when voting.

Having made those various explanations, may I put the motion to the meeting? I will read it again: "That the report of the directors and statement of accounts for the year ended December 31, 1934, be received and adopted."

(The resolution was put to the meeting and carried unanimously.)

The Chairman: The next motion I have to propose is: "That dividends be paid for the half-year ended December 31, 1934, of £2 10s. per cent. on the consolidated guaranteed stock, £2 10s. per cent. on the consolidated preference stock, and £2 10s. per cent. on the five per cent. redeemable preference stock (1950). That a dividend of £2 15s. per cent. for the same half-year be declared on the consolidated ordinary stock, making with the interim dividend of 5s. per cent. paid for the half-year ended June 30 last £3 per cent. for the year. That such dividends be paid on and after the 5th proximo to the proprietors who were registered in the books of the company when balances were struck on the 23rd ultimo." I shall ask Lord Palmer to second that.

Lord Palmer: I have much pleasure in seconding that resolution.

(The resolution was put to the meeting and carried unanimously.)

The Chairman: Will Mr. Roxburgh propose the re-election of the retiring Directors?

Mr. Francis Roxburgh: Mr. Chairman, Ladies and Gentlemen, I have much pleasure in moving that the following Directors now retiring by rotation be and they are hereby re-elected: The Rt. Hon. Sir Robert Horne, G.B.E., K.C., M.P., the Rt. Hon. Lord Palmer, Sir Percy E. Bates, Bt., G.B.E., the Rt. Hon. Lord Glanely, Sir Henry Mather Jackson, Bt., C.B.E., Mr. Cyril E. Lloyd, Mr. Geoffrey F. Luttrell, and Sir W. James Thomas, Bt.

Captain J. C. Newnand: I have much pleasure in seconding that resolution.

(The resolution was put to the meeting and carried unanimously.)

Colonel Courtney R. Kelly: I beg to propose that the following gentlemen be and they are hereby appointed members of the Audit Committee for the ensuing year: Sir George Lewis Barstow, K.C.B., 36, Sussex Gardens, W.2; Sir W. Edgar Horne, Bt., 110, Mount Street, W.1; Mr. Reginald J. R. Loxdale, Castle Hill, Llanilar, Aberystwyth; Mr. D. Rupert Phillips, The Greenway, Radyr, Glamorgan; and Mr. W. J. Stevens, Court Lodge, Merstham, Surrey.

Mr. J. J. Anthony: I beg to second that.

(The resolution was put to the meeting and carried unanimously.)

The Chairman: I do not know whether Colonel Hilder still wishes me to put his motion to the meeting.

Lieut.-Commander A. F. Inglefield: I have very much pleasure in seconding that resolution. It is a resolution for which I think there is very general support and which, judging from the letters which I have received from stockholders, would be received with widespread gratitude if the directors were agreeable to it.

The Chairman: I shall put it to the meeting. Will those in favour of Colonel Hilder's resolution hold up their hands? . . . . Those against? . . . . I declare the resolution defeated.

Ladies and gentlemen, that ends the business of the annual general meeting.

### Special General Meeting

The Chairman: Ladies and gentlemen, we now have to resolve ourselves into the special general meeting to which I referred in my earlier speech for the purpose of approving two Bills in Parliament. I have already explained the objects of the Bills. The first is our own Bill, and I beg to move: "That the Bill now submitted to the meeting entitled 'A Bill for conferring further powers upon the Great Western Railway Company and for other purposes,' be and the same is hereby approved subject to such alterations therein as may be sanctioned by Parliament."

Lord Palmer: I beg to second that resolution.

(The resolution was put to the meeting and carried.)

The Chairman: I beg to move: "That the Bill now submitted to the meeting entitled 'A Bill to make further provision as to the tolls and charges leviable by the company of proprietors of the Stourbridge Navigation; to authorise the transfer to the company of part of the Stourbridge Extension Canal; and for other purposes,' be and the same is hereby approved subject to such alterations therein as may be sanctioned by Parliament."

Lord Palmer: I second that resolution.

(The resolution was put to the meeting and carried.)

The Chairman: Now, ladies and gentlemen, that ends our business, and I have to thank you very much for your attendance today, for the happy meeting that we have enjoyed together, and I hope we shall all meet in the same good spirit and perhaps with even better fortune next year. (Hear, hear and applause.)

Mr. Leslie Boyce: Ladies and gentlemen, before we disperse, I feel sure it would be the wish of all present that we should pass a very hearty vote of thanks to our Chairman for presiding at our meeting, and also to the staff and servants of the company, and to wish the company during this Jubilee year continued success under the Chairman's very able chairmanship.

The Chairman: Thank you very much.

## MERSEY RAILWAY COMPANY

### *New works and rolling stock—How Queensway affects Merseyside transport*

The ordinary general meeting of the Mersey Railway Company was held at Winchester House, Old Broad Street, on Friday, February 22, Mr. John Waddell, J.P. (Chairman of the company) presiding. Mr. Joshua Shaw (Secretary) read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and accounts, said that the net revenue, after making a provision of £6,000 for the renewal funds as last year, amounted to £85,636, as compared with £82,889 for 1933. To this was added £412 of expenses previously charged to revenue and now recovered, making a total of £90,549. After deducting £56,143 for interest on debenture stocks, £1,000 appropriated to general reserve and £19,472 for preference dividends, making a total of £76,615, the balance remaining for dividends on the ordinary stock was £13,933 15s. 9d., comparing with £11,563 2s. 9d. in 1933. Of this, £10,591 19s. 5d. went to the payment of a  $\frac{1}{2}$  per cent. dividend, leaving £3,341 16s. 4d., against £4,502 in 1933, to be carried forward.

Gross receipts, at £213,773, had increased by £4,282, but expenditure had risen by £2,016 to £128,133, so that net



receipts were £85,640, compared with £83,374 in the previous year. There had been 529,048 more passenger journeys in 1934 than in 1933. The working expenditure, including pumping, represented 59.94 per cent. of traffic receipts, whereas the percentage in the preceding year had been 60.20. The total of the renewal, contingency and reserve funds amounted to £108,005, or an increase of £6,570. Investments at December 31 last showed an appreciation of £4,054 over book value.

Turning to the operation of traffic, the Chairman said that although the cheap fare facilities between Liverpool and the resorts in the Wirral peninsula had been extended, less favourable weather than during 1933 had caused receipts from this source to be smaller. In order to encourage first class travel, fares had been reduced from 50 per cent. to 25 per cent. above third class, and the success of this policy was reflected in the first class local traffic receipts.

In order to cope with the demands of the rapidly growing residential districts, it had been decided to increase the capacity of the trains by 40 per cent. by adding an extra third class coach to the normal five-coach formation when required. It would be necessary to lengthen the platforms at Liverpool Central (Low Level) and Green Lane stations to accommodate the longer trains, and to extend the tunnel at the former station by two single-line tunnels, 100 and 125 ft. long, to permit shunting from the arrival to the departure platforms. It was expected that the works and the new rolling stock would be ready for next winter's traffic. A total estimated cost of £22,250 had been provided for by the placing of an additional £36,217 of "B" debenture stock, which had produced £22,568. It was anticipated that the necessary order from the Ministry of Transport for the construction of the works would shortly be made.

Immediately after the opening of the new Mersey road tunnel (Queensway) in July, a large volume of what might be termed "curiosity" traffic had undoubtedly caused a certain temporary loss to the company. Although this had eased at the end of the summer, the number of vehicles and passengers using the tunnel was still twice that formerly carried on the goods ferry steamers. The increase was probably partly new traffic and partly former patrons of the Mersey Railway and the Birkenhead and Wallasey corporation ferries. Mails, formerly carried by the company, had also been diverted to Queensway, where the road vehicles conveying them were exempt from toll.

#### Cross-River Omnibus Traffic

The Birkenhead Corporation was now working its ferries on behalf of the Tunnel Committee, and it appeared that the arrangement had resulted in considerable losses to the municipalities on both sides of the river. Cross-river transport facilities were now faced by an entirely new situation, and were effect to be given to proposals appearing in the press that a regular omnibus service should be operated through Queensway, it would affect not only operators between the Lancashire and Cheshire shores, but undertakings on either side of the river. A conference of local authorities and transport bodies had been proposed to review the question, with especial reference to the suggested Queensway buses and the elimination of unnecessary competition, but the proposal had been withdrawn. Recently the Corporation of Liverpool requested the Corporation of Birkenhead to appoint representatives to discuss with them the question of a bus service between the municipalities. This had been done, but as yet no statement had been issued as to their deliberations.

Applicants wishing to run public service vehicles through Queensway would have to satisfy the Traffic Commissioners that such services were in the public interest. An application had lately been made for permission to extend two stage carriage services now terminating at Birkenhead to Liverpool via Queensway. It contained a proviso that no passengers were to be picked up within 8 miles of Birkenhead Town Hall for conveyance to Liverpool, and that none were to be picked up in Liverpool for conveyance to points within the area specified on the Cheshire side. After a full hearing the Traffic Commissioners, on December 12, reserved their decision, expressing the hope that a suitable scheme

of co-ordinated services would be arrived at before the expiration of six months.

#### Future of the Company

It was the view of the board that, whatever the future might hold, the unique position of the Mersey Railway and the services it had rendered were acknowledged during the passage of the Mersey Tunnel Act, 1925, in which provisions were expressly inserted by Parliament for the protection of the stockholders. The company was vitally interested in the prosperity of Merseyside, to which it could claim to have made an important contribution, and would gladly consider any scheme conducive to furthering the welfare of the area which was not inimical to the interests of the railway as indicated and directed by Parliament.

Answering various questions raised by shareholders, the Chairman said that the best sign pointing to the future of the railway was that workmen's traffic was going up. The company was very much affected by the trade of Liverpool and Birkenhead. He agreed that an increasing asset of the Mersey Railway was the development of the Wirral peninsula. Houses were being built in all directions, and that traffic would not be diverted to Queensway. This district had developed more rapidly in the last two years than ever before. The amusement parks and facilities at New Brighton were being extended, and this would bring traffic quite apart from what Queensway might open up.

The report and accounts were adopted unanimously. To conclude the business of the meeting, Mr. Robert Carter was re-elected a director of the company and the Rt. Hon. Lord Plender was re-appointed as auditor for the ensuing year.

## GREAT NORTHERN RAILWAY CO. (IRELAND)

### Road competition—Improved hotel business — Railcar developments

The ordinary general meeting of the proprietors of the Great Northern Railway Company (Ireland) was held in the Gresham Hotel, Upper O'Connell Street, Dublin, on Wednesday, February 27, Sir Lingard Goulding, Bart., (Chairman of the company), presiding.

The Secretary (Mr. F. C. Wallace) read the notice convening the meeting and the auditors' report.

The Chairman moved the adoption of the report and accounts and in the course of his address said:—

The directors' report and abridged statement of accounts for the year 1934 show that the decline in the company's fortunes has been stemmed and some definite improvement achieved. The results are still far from what we must aim at, but the ground gained is not unsatisfactory in face of the tremendous difficulties created for the line by the drastic changes in the course of trade during recent years.

Owing to the strike which took place in the early months of 1933 when the line was practically closed for many weeks, comparisons with that year are not informative and I will therefore refer also to some figures of the year 1932. The gross railway receipts increased by £200,806, or 24 per cent. as compared with 1933 but represent a decrease of £184,081, or 15 per cent. as compared with 1932. Passenger train traffic increased by £111,596, or 27 per cent., but is still £48,840 (9 per cent.) less than in 1932. Goods train traffic was up by £81,963, or 22 per cent., but £132,087, or 23 per cent. less than 1932, and miscellaneous and joint lines receipts were less by £3,940, or 10 per cent. compared with two years ago.

The number of passengers carried (excluding season tickets) was 445,059 less than in 1932, but the total number of passengers carried in that year was abnormally large due to the Eucharistic Congress. The volume of merchandise traffic, though up on 1933, is less than in 1932 by 89,536 tons (15 per cent.) and the receipts by £101,676 (25 per cent.) In mineral (including coal) traffic the tonnage is 32,434 (10 per cent.) less than two years ago and the receipts £30,486



(29 per cent.) lower. As regards live stock, while 11,533 (3 per cent.) fewer animals were carried, the receipts remained about the same as in 1932.

It is self-evident that the whole political and fiscal basis of trading between the Free State and Northern Ireland could not be altered so radically as it has been in the past two years without gravely affecting the volume of business available for our system. In addition we have had to face intensive road competition which continued with unabated severity during the period, while the disastrous strike of 1933 inevitably lost us much business which it must take time to recover.

#### Acquisition of road powers

Effective co-ordination in the case of passenger traffic has already been secured. Due to various causes, there has been considerable delay in the setting up of the machinery under the Act to deal with road lorry services, and it has only been possible within the last few months to take steps to acquire road hauliers' licences. It may be some time therefore before the company can hope to derive material advantage from that part of the legislation.

Many of you may remember the discussion at our meeting in Belfast last year regarding transport conditions in Northern Ireland. The Government, realising none too soon the seriousness of the situation, invited Sir Felix Pole to make a full investigation of the matter, and that gentleman furnished a comprehensive report containing recommendations as to the best means of meeting the admitted crisis. The Government has since announced its intention to accept the main principles of the report, and I understand that legislation to give effect to them will be introduced next month. A considerable time must, however, elapse before an estimate can be formed of the effect on your company which the contemplated changes in transport conditions will produce.

Against the fall which occurred in revenue, expenditure has been reduced by £163,069, or 14 per cent., compared with 1932. With a smaller volume of traffic to be handled a substantial reduction in the number of employees became inevitable, and I regret that last year there were about 750 fewer employed than in 1932.

The loss on the road motor services has been reduced to £8,317, which is a great improvement on both 1932 and 1933 due both to larger receipts and to unremitting attention to the important matter of working costs, it being our constant aim to secure a profit in this department.

Improved net receipts to the extent of £2,680 have been secured in the hotels, refreshment rooms and dining cars, compared with £1,719 in 1933 and £209 in 1932. Patrons of our hotels are steadily growing in number—a proof that we are developing the business on proper lines and meeting the requirements of the public. By arrangement with the L.M.S.R. we have undertaken the control of the Greenore

Hotel. We have instituted our own management, and the hotel has been redecorated. Anyone, therefore, who wishes to spend a holiday in the beautiful Carlingford district, with the advantage of an excellent 18-hole golf course, will find the accommodation at the hotel most comfortable and the catering excellent.

Miscellaneous receipts, £35,557, show the small decrease of £1,695 compared with 1933, or £29,072 less than in 1932. In the latter year, however, we were earning 5 per cent. on our holding of war stock against  $3\frac{1}{2}$  per cent. in the subsequent years, while in the 1932 accounts the exceptional amount of £10,386 was included in respect of profit on conversion of the 5 per cent. war loan.

The final result of the year's working shows a surplus in total net income of £76,282, which, after meeting fixed charges, debenture interest and the guaranteed stock dividend, leaves a deficit of £72,954. To meet this deficit, £7,500, the balance of compensation under the Irish Railways (Settlement of Claims) Act, 1921, has been appropriated, and £65,454 has been taken from credit balances now released.

#### Experiments with diesel traction

When addressing you last year I mentioned that we were examining the question of rail omnibuses and cars. Our Chief Engineer has now equipped us with first class vehicles of these types. We have a number of rail omnibuses working, giving a service either supplemental to, or in place of, steam trains. The latest diesel railcar has been running on the Bundoran branch line since October last and has given such satisfactory results that we have placed orders for two more to be used on suburban services.

As regards the current year, and the future, our traffic receipts to this date show a slight improvement over 1934. This we all appreciate, but it should be clearly realised that if we are to close this year's Accounts on the right side no one must spare his utmost effort to secure a very substantial increase in our business. We have about 5,000 employees and the stockholders number about 9,000. If each one would do his utmost to influence traffic for the company we would have one of the most effective and powerful canvassing organisations that could be conceived.

Last year I estimated the loss of traffic to the company due to the economic war at between £150,000 and £200,000 per annum, and that loss is not declining. A shock of that magnitude must shake the foundations of any trading organisation and is one which the best efforts of the board and of the staff can do little to counteract. Hopes have been raised by the recent coal-cattle agreement between the Free State and Great Britain and I am sure you share our earnest desire that further developments along similar lines may take place and bring in their train a restoration of the traffic we used to carry.

The resolution was unanimously agreed to.

### Beira Railway Co. Ltd.

Speaking last week at the ordinary general meeting of the Beira Railway Co. Ltd., Sir Henry Birchenough, Bt., K.C.M.G. (Chairman of the company), said:—

You will see that the gross revenue shows an increase of no less than £148,747, as compared with the previous year. This large increase in gross revenue was obtained by an increased expenditure of only £20,951, the net earnings being thus £127,796 higher than in the previous year. This result, I am sure you will agree, is most satisfactory and encouraging. The chief item of increase in revenue was obtained from general merchandise, which shows an increase of 36,571 tons, giving an increased revenue of £93,404. As stated in the report, this improvement reflects the increased spending

power of the territories we serve, and is an indication of better trade all round in Northern and Southern Rhodesia.

The copper from the mines in the Belgian Congo and Northern Rhodesia consigned to Beira for export during the year amounted to 187,434 tons, an increase of 59,255 tons over the previous year, and is, in fact, again a record for this class of traffic. Asbestos traffic at 30,435 tons, though good, was some 1,486 tons lower than last year, but zinc at 21,822 tons, showed an increase of 6,676 tons.

It is satisfactory to note that the traffic in chrome ore, which has been in a depressed state for some years, has at length taken an improved turn, the tonnage railed—67,287 tons—showing an increase of 41,825 tons over the figure for the previous year.

Turning to the accounts, you will see on the credit side of the profit and loss account, that the net receipts of the line amounted to £332,094, or £127,796 more than in the previous year. On the debit side, you will see a small decrease in general charges, which includes the loss on the Savoy Hotel for the year. The reasons for the poor financial results are that the numbers of travellers embarking and disembarking at Beira are still less than before the trade depression, while train services to and from Rhodesia and Nyasaland are so much improved that travellers are not now detained for any length of time at the port. On the other hand, much more use is now being made of Beira as a health resort by Rhodesians who require a short holiday at the coast, and we have recently introduced a lower tariff at the hotel, which we hope will attract this class of business.

I think it will now be convenient to deal with the question of the moratorium, which, as you know, came into effect in December, 1932. As all debenture interest and sinking fund payments have now been paid in full to date, and the current net earnings continue on a satisfactory basis, your directors have under consideration the advisability of terminating the moratorium at an earlier date than the normal expiration date, which is January 31, 1936.

The position is, that when the moratorium is terminated, open loans, including accrued interest, from the Rhodesia and Mashonaland Railway Companies, which amounted at September 30, 1934, to £268,482 12s. 1d., immediately become due for repayment. As these loans carry a high rate of interest, it would suit this company to utilise its surplus funds to repay a portion at the earliest possible date, provided arrangements can be made to spread the balance over a reasonable period.

During the year under review, your directors considered it advisable to have an independent inspection of the physical assets of the company, and selected Mr. R. C. Wallace, M.Inst.C.E., M.Inst.T., who was, until his retirement, Chief Civil Engineer of the South African Railways, for this purpose.

Mr. Wallace inspected the whole of our line in August and September last—permanent way, buildings, bridges, culverts, etc.—and you will be pleased to hear that he gave the board the following certificate:—"I am able to state that the physical assets of the Beira Railway have not only not deteriorated but that they have very definitely appreciated. The railway is maintained in a good working condition." This is, I am sure you will agree, very satisfactory. The board intends to have a similar inspection made every few years.

Dealing, in conclusion, with the present position and prospects, the Chairman observed:—

You will have seen a comparison in the report of the average monthly net revenue for four half-yearly periods, showing a progressive increase, the largest increase being for the last half-year—namely, to September 30, 1934. Up to the present date we have only received traffic returns for the first three months—October-December, 1934—of the current financial year, and those three months show a satisfactory further increase in net revenue. One of the most important factors at present affecting our revenues is the traffic to and from the copper mines in Northern Rhodesia, and I have already alluded to the large increase in the tonnage of copper railed to Beira last year. It has been satisfactorily demonstrated that Rhokana Corporation Limited, and the Roan Antelope Copper Mines Limited, can produce copper at a profit, even at the present low price.

In conclusion, I may say that, provided that the copper industry in Northern Rhodesia and the Belgian

Congo continues to operate on a satisfactory basis, and no serious curtailment of its activities is necessary, I trust that we shall soon again enter

the era when we can resume the payment of dividends.

The report and accounts were unanimously adopted.

## Civil Engineers' Dinner

The annual dinner of the Institution of Civil Engineers took place at the Savoy Hotel, London, on February 27, under the presidency of Sir Richard Redmayne. Among those present were:—

The French Ambassador, Admiral of the Fleet Lord Jellicoe, Lord Stonehaven, Lord Plender, Lord Snell, Lord Trent, Lord Rochester, Lord Strabolgi, Lord Teignmouth, Mr. W. Ormsby-Gore, M.P. (First Commissioner of Works), Major G. C. Tryon, M.P. (Minister of Pensions), the High Commissioners for the Irish Free State, Southern Rhodesia and India. Messrs. A. L. Anderson, J. S. Anderson, K. A. Wolfe Barry, W. J. E. Binnie, Asa Binnis, Sir Charles Bressey, Messrs. J. Burdon, C. R. Byrom, R. Carpmal, A. R. Cooper, Colonel A. E. Davidson, Messrs. G. E. Dutton, G. Ellson, W. Eraut, P. H. Ezechiel, H. J. Fereday, Colonel J. G. Fleming, Messrs. F. Fletcher, S. E. Gareke, R. F. B. Gaudin, N. G. Gedy, Sir Alexander Gibb, Messrs. W. W. Grierson, W. J. Hadfield, W. T. Halcrow, Sir Harold Hartley, Mr. J. S. Highfield, Sir Clement Hindley, Mr. R. F. Hindmarsh, Sir Frederick Gowland Hopkins, Sir George Humphreys, Sir Cyril Hurcomb, Mr. H. H. Jeffcott, Sir Cyril Kirkpatrick, Mr. J. P. Le Grand, Sir Malcolm McAlpine, Messrs. A. H. McMurdo, R. M. Holland-Martin, Sir Henry Maybury, Messrs. D. Melville, J. Miller, Sir Charles Morgan, Lt.-Col. A. H. L. Mount, Brig.-Gen. Magnus Mowat, Sir David Owen, Mr. L. St. L. Pendred, Sir Joseph Petavel, Messrs. A. L. B. Plunkett, W. Reeve, H. W. H. Richards, G. A. Rotinoff, P. F. Rowell, C. P. Sandberg, O. F. A. Sandberg, Sir Giles Scott, Mr. F. E. Wentworth-Shields, Sir Frank Smith, Professor W. M. Thornton, Sir John Thornycroft, Messrs. H. T. Tizard, J. S. Tritton, Sir Herbert Walker, Sir Ralph Wedgwood, Lt.-Col. E. Woodhouse, and Mr. W. B. Worthington.

The Duke of York, proposing the toast of "The Institution of Civil Engineers," referred to the world-wide scope of the civil engineer who had

INSTITUTE OF CIVIL ENGINEERS.



"After you, Sir."  
"No, Sir. . . . After you."  
"No, after you."  
(ad nauseam)

The "Inst.C.E." as seen by Lee in  
"The Evening News"

taken such a big share in the welfare of the human race that he might appropriately be termed the engineer of civilisation. The child of today was surprisingly mechanically minded, which was probably an example of how nature soon teaches us to become familiar with our surroundings. The charter of the institution claimed for the civil engineer "the art of directing the great sources of power in nature for the use and convenience of man." His Royal Highness concluded by congratulating the institution on its 117 years of useful achievement.

Sir Richard Redmayne, the President, responding, referred to the assistance which members of the Royal Family so freely gave to the aims of the great societies of science and technology. The members of the Institution of Civil Engineers expressed their loyal and devoted affection to His Majesty the King on the occasion of his Jubilee. In the future he believed that the substitution of the machine for man would make for the benefit of mankind in increase of wealth, leisure, and comfort.

Lord Macmillan proposed the toast of "His Majesty's Ministers" who, like civil engineers, were constantly engaged in great public works; in providing props and struts to prevent the collapse of many undertakings and in resisting the stresses and strains of everyday life. There were times when these stresses and strains made some of His Majesty's Ministers regret that day in the year 1736 on which James Watt first saw the light. But for that event they might not be faced with the problems that beset them today. He was, however, convinced that present troubles sprang from remediable evils and removable causes and that the civil engineer, when these removable restrictions no longer operated, would be seen as the great benefactor of mankind he really was.

Sir John Simon, replying, referred to the provocation under which James Watt was induced to develop the steam engine. He read out a notice issued a couple of hundred years ago to the people of Edinburgh, inviting such of them as wanted to reach London to rise at 5 in the morning and take the coach from the White Horse Inn which would get them to London eight days later. In view of the well-known tendency of Scotsmen to come south it was understandable that they felt the necessity for taking some measures to speed up this journey.

Sir Brodie Henderson, Past-President, proposed the toast of "Our Guests," and Monsieur C. R. Paravicini, the Swiss Minister, and Lord Tomlin of Ash, Lord of Appeal in Ordinary, responded.

## MINISTRY OF TRANSPORT ACCIDENT REPORTS

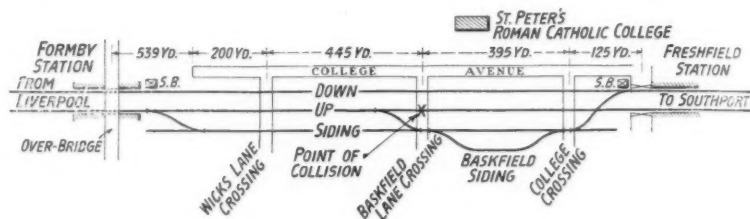
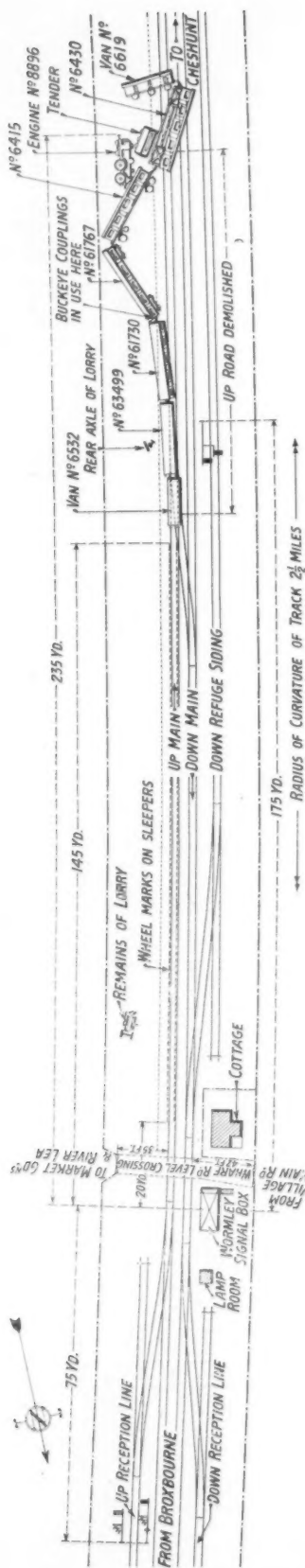
Between Formby and Freshfield,  
L.M.S.R., October 2, 1934.

Wormley, between Broxbourne  
and Cheshunt, L.N.E.R., November  
27, 1934.

Both these accidents were collisions between passenger trains and motor vehicles at an occupation level crossing, and each was investigated by Colonel Trench. It will be convenient and desirable, therefore, to review both the accident reports together. We shall, however, deal here only with the facts in each case. A sketch which we have prepared of the scene of the Formby-Freshfield accident and the Wormley plan that accompanies Colonel Trench's report are reproduced

were on the up line when he saw the 8.31 a.m. express from Cambridge to Liverpool Street approaching. The train struck the lorry but its driver miraculously escaped with his life. The train, however, was derailed and the driver and fireman were killed.

Whilst waiting for the passage of the goods train, Skeggs, the driver of the motor, had a conversation with a man who owned one of the market gardens on the east side of the railway. In their talk the latter commented on the need for control at the crossing and Skeggs agreed, saying that he knew this. There was no evidence to disprove his statement that when he emerged on the line he looked both ways and could see no train. It was



herewith. Colonel Trench's recommendations are noted in our editorial pages.

The level crossing concerned in the earlier accident is known as Barkfield Lane. The railway from Liverpool to Southport runs almost due north, with the sea, at this point, about 1½ miles away. The motor vehicle in this case came to a stand at the gate on the west side of the occupation crossing, and the driver opened that gate and then crossed the line to open the other gate. He left a companion in the lorry, and whilst he was away to open the gates the other man started the vehicle; he had reached the down line when the lorry was struck by the 4.32 p.m. electric express from Liverpool to Southport. The man was killed and the motor vehicle destroyed, but there were no personal injuries in the train and little material damage.

At Wormley—so called from the village of that name and the signal-box near the scene of the accident—the occupation level crossing is in Wharf Road. The signal-box has no control of the crossing, but it is a common practice of a number of vehicle drivers to call out to the signalman and ascertain whether it is safe for them to cross.

The motor driver had stopped outside the west or down side gate to allow a down goods train to pass. His story was that he then opened the west gate, crossed the line and opened the east gate and returned to the lorry. He looked both ways as he crossed and, seeing no train, he drew forward, on re-entering his cab, and his front wheels

probable also that with the noise of his engine, in first gear in a closed cab, he could not hear the express approaching.

But, in Colonel Trench's opinion, the question arose as to whether the man took reasonable precautions before driving on to the crossing. He was aware that it was one requiring special caution and had just been reminded of that in conversation. On this occasion, the fog, with a visibility of about 150 yd., was sufficient to limit his vision to short range. He said that he had not seen any signals on any occasion. That was a statement that was hard to credit but if, Colonel Trench says, it was true, then his looking up and down the line for trains must have been of a very casual nature, as the signals, in both directions, are conspicuously visible and the up signals are at very short range. His failure to make any attempt to obtain instructions from the signalman on the very unconvincing excuse that he thought that the box was unoccupied—an assumption for which he had no grounds whatever, and which he could have disproved in a few seconds—does, the inspecting officer thinks, indicate a grave lack of reasonable caution.

Since the accident the railway company has provided a notice on the gates warning the drivers of road vehicles to ask the signalman before crossing.

Colonel Trench found, however, on a third visit, that, in spite of these notices and notwithstanding the notoriety of the accident in question,



a number of lorry drivers continued to cross without asking whether it was safe, and only a few minutes before his inspection one lorry had crossed about 50 yd. ahead of an ap-

proaching train. "Such recklessness," the report observes, "can only be attributed to the fact that a certain class of driver is prepared to take the same risks at a railway crossing as

he does on the roads, when he can in most cases rely on the other man's braking capacity, and he is presumably ignorant of the very different braking capacity of a train."

## QUESTIONS IN PARLIAMENT

### Piccadilly Railway Traffic

Mr. West on February 7 asked the Minister of Transport whether his attention had been called to the dangerous overcrowding which occurred, particularly in the evening rush hours, on the Piccadilly Tube trains from Hammersmith to South Harrow and Uxbridge; and if he would address urgent representations to the London Passenger Transport Board with a view to immediate steps being taken at least to double the present service of trains to South Harrow in view of the fact that some of the trains at present carried 400 standing passengers.

Mr. Hore-Belisha.—The London Passenger Transport Board does not admit that crowding of a serious nature is taking place on the railways to which the hon. member refers, but informs me that the traffic is expanding and that the service will be augmented shortly with additional rolling stock.

### Level Crossing Accidents

Rear-Admiral Sir Murray Sueter on February 13 asked the Minister of Transport whether he would look into the whole question of the uncontrolled level crossings between Cambridge and London to see that they were guarded in an efficient manner, as the inhabitants in places like Sawbridgeworth who used these crossings were apprehensive as to their safety whilst they remained uncontrolled.

Rear-Admiral Sir Murray Sueter also asked the Minister of Transport, in connection with the recent railway accident at the level-crossing at Wormley, Hertfordshire, whether he was aware that where a level-crossing existed on an occupation road that had not been dedicated to the public and which was used for public vehicular traffic to the knowledge of the railway company, the railway company was under duty to take proper precautions for the safety of persons using the crossing; and what he proposed to do to make the North Eastern Railway Company discharge its duty in the interests of the safety of the public.

Mr. Hore-Belisha, replying to both questions.—I am advised that the legal position is that persons entitled to use occupation crossings are, in the absence of negligence on the part of the railway company, responsible for their own safety. I am sending the hon. member a copy of the report of the inquiry into the Wormley accident, from which he will see that the inspecting officer makes certain recommendations both with regard to the particular crossing

concerned, and also with regard to other crossings.

### A West London Bridge

Sir William Davison asked the Minister of Transport what was the present position with regard to the erection of a bridge across the West London Extension Railway, whereby the existing dead-end of Western Avenue at Wood Lane might be removed.

Mr. Hore-Belisha.—As soon as the negotiations now proceeding between the railway companies and the London County Council are concluded, I hope it will be possible to commence construction.

### A Chinese Transport Mission

Mr. Nunn asked the Minister of Transport whether he could give any information as to the recent visit to this country of a Chinese transport mission led by Mr. Yu Fei-peng, vice-Minister of Communications; by what Minister the mission was received; and whether any results were expected to accrue from it.

Mr. Hore-Belisha.—Yes. The mission to which my hon. friend refers arrived in this country on November 14 last with the object of studying civil and military transport. The head of the mission was received by myself. Full arrangements were made for the mission to study all aspects of communications and transport, civil and military, in this country, including the railways, shipping, posts, telephones,

and telegraphs, and also the B.B.C. The mission has now left this country. I understand that similar technical studies are being carried out on the Continent. As regards the results achieved, the mission will have been enabled to gain an insight into British methods of transport and the value of British material and return to their country with an appreciation of British enterprise in this sphere.

### Number of Occupation Crossings

Lieutenant-Commander Tufnell on February 19, asked the Minister of Transport whether he proposed to suggest to the railway companies that they should collect data as to the total number of occupation crossings in the country and consider what practical measures were necessary for securing additional safety.

Mr. Hore-Belisha.—I am already in communication with the railway companies on these points amongst others.

### L.M.S.R. Tests of French Railcar

Mr. Thorne on February 26 asked the Minister of Transport if he could give the House any information in regard to the secret tests of a high-speed French railcar at Tilbury.

Mr. Hore-Belisha.—At the request of an English firm, and in accordance with the practice of keeping informed of the latest developments, the L.M.S.R. agreed to give the car in question trials to see whether or not there is a field for its operation on the L.M.S. system, and to test out its technical and commercial possibilities. There is, however, no question of secret tests being made, or of special high-speed operation.

## Third International Rail Congress, Budapest, 1935

At the second International Rail Congress, held in Zurich in 1932, it was resolved that the third congress should be held in Budapest. It is now announced that the Hungarian Association for the Testing of Materials has undertaken the organisation of this congress, and it will be held at Budapest from September 8 to 12, 1935. Papers for presentation should be submitted to the Association Institute by March 1, 1935. Papers may be presented in English, French, German or Italian. The programme of the congress will cover the following subjects:—

- (1) Questions of general importance.
- (2) Usage.
- (3) Brittleness. Internal stresses. Fatigue
- (4) Working experiences.
- (5) Questions of detail.
- (6) Welding.

The entrance fee is £1 and in-

cludes advance summaries of the communications to be presented and also a full report in book form to be published after the congress. It will be recalled that a similar book report was published after the last congress and was noticed in THE RAILWAY GAZETTE for July 7, 1933. It was examined in detail in *The Railway Engineer* for August, 1933.

Further information will be supplied on application to Dr. Ing. V. Mihailich, President of the Hungarian Association for Testing Materials, Budapest XI., Muegyetem.

One of the features of this congress will be exhibits of lengths of welded rails. It is understood that a 300-metre length will be electrically welded and a similar length by the Thermit process. It is probable also that there will be specimens of oxy-acetylene welding.

## BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table of freight and Passenger traffic figures for November, 1934, as compared with the corresponding period in 1933, compiled from the Ministry of Transport Statement No. 180

Description	Great Britain*	Great Western	London & North Eastern	London Midland & Scottish	Southern
<b>PASSENGER TRAIN TRAFFIC—</b>					
Number of passenger journeys (excluding season-ticket holders)	95,548,314	6,744,322	13,037,104	21,334,342	16,246,096
Increase (+) or decrease (—)	+ 5,091,152	+ 161,742	+ 285,307	+ 608,007	+ 624,532
Passenger receipts (excluding season-ticket holders)	£3,140,869	£398,512	£602,807	£936,799	£662,289
Increase (+) or decrease (—)	+ £143,432	+ £11,160	+ £22,185	+ £45,479	+ £24,627
Season-ticket receipts	£703,744	£43,803	£121,180	£190,924	£219,228
Increase (+) or decrease (—)	+ £7,268	— £788	— £724	— £4,796	+ £8,578
Parcels and miscellaneous traffic receipts (excluding parcels post)	£1,072,190	£197,078	£308,223	£419,877	£126,274
Increase (+) or decrease (—)	— £1,169	+ £4,119	— £11,045	+ £11,594	+ £1,044
<b>FREIGHT TRAIN TRAFFIC—</b>					
Freight traffic (tons) (excluding free-hauled)	22,676,669	5,072,183	10,598,873	10,636,977	1,404,788
Increase (+) or decrease (—)	+ 372,062	— 21,354	+ 173,493	+ 447,091	+ 6,535
Net ton-miles (excluding free-hauled)	1,271,402,117	223,757,572	435,194,546	520,296,244	56,328,003
Increase (+) or decrease (—)	+ 31,471,461	+ 2,522,339	+ 5,817,872	+ 24,398,635	+ 1,002,865
Average length of haul (miles) (excluding free-hauled)	56.07	44.11	41.06	48.91	40.10
Increase (+) or decrease (—)	+ 0.48	+ 0.68	— 0.13	+ 0.24	— 0.52
Freight traffic receipts	£7,129,139	£1,169,000	£2,391,500	£2,937,000	£402,799
Increase (+) or decrease (—)	+ £13,926	— £6,745	— £21,500	+ £46,000	— £4,195
Receipts per ton-mile	1.346d.	1.25d.	1.32d.	1.36d.	1.72d.
Increase (+) or decrease (—)	— 0.031d.	— 0.02d.	— 0.03d.	— 0.04d.	+ 0.01d.
Freight train-loads—					
Average train-load (tons)	129.21	133.74	135.82	126.26	106.65
Increase (+) or decrease (—)	— 0.36	— 1.02	— 1.72	+ 0.75	— 2.34
Net ton-miles—					
Per train engine-hour	978.22	1,060.78	1,033.44	933.79	815.17
Increase (+) or decrease (—)	— 38.96	— 19.53	— 28.07	— 53.60	— 52.04
Per shunting-hour	861.73	774.37	948.07	892.87	574.71
Per total engine-hour	458.14	447.61	494.46	456.44	337.07
Net ton-miles per route-mile per working day	2,776	2,625	3,015	3,283	1,179
Increase (+) or decrease (—)	+ 71	+ 34	+ 40	+ 157	+ 9
Wagon-miles. Total	358,667,798	62,761,471	124,709,958	151,610,546	17,240,204
Increase (+) or decrease (—)	+ 4,660,352	+ 874,585	+ 992,026	+ 3,203,203	+ 196,835
Percentage of loaded to total	67.77	68.71	65.31	69.51	67.22
Wagons per train—					
Total	34.43	34.68	34.89	34.56	30.91
Increase (+) or decrease (—)	— 0.52	— 0.34	— 0.65	— 0.47	— 0.78
Loaded	23.33	23.83	22.79	24.02	20.78
Empty	11.10	10.85	12.10	10.54	10.13
Train-miles. Coaching—					
Per train-hour	14.97	13.91	14.10	14.36	17.40
Per engine-hour	12.00	11.13	10.98	10.97	14.25
Train-miles. Freight—					
Per train-hour	8.87	9.53	8.88	8.59	9.40
Per engine-hour	3.55	3.37	3.68	3.60	3.12
Engine miles. Total	45,058,891	7,073,345	12,515,745	16,727,840	5,833,382
Increase (+) or decrease (—)	+ 1,079,031	+ 165,922	+ 280,758	+ 604,549	+ 30,197
Mileage run by engines. Total train-miles—					
Coaching	21,827,433	3,001,021	4,982,264	6,967,955	4,208,669
Freight	10,416,395	1,809,605	3,574,442	4,387,082	557,749
Engine-hours in traffic. Total	4,956,513	831,264	1,492,493	1,940,068	492,637
Increase (+) or decrease (—)	+ 180,507	+ 18,283	+ 41,200	+ 110,323	+ 12,192
Shunting miles per 100 train-miles—					
Coaching	7.59	6.85	6.65	8.41	8.38
Freight	74.90	85.94	70.38	70.46	97.37

\* All standard-gauge railways

Passenger Traffic Statistics: Number of Journeys, Receipts, and receipts per journey (excluding Season-Ticket Holders)—November, 1934

Subject	Great Britain	Great Western	London & North Eastern	London Midland & Scottish	Southern	Cheshire Lines Committee	Liverpool Overhead	London Passenger Transport Board†	Mersey
<b>Full fares—</b>									
Passenger journeys	32,019,166	649,957	1,076,598	1,452,421	2,514,967	19,691	155,359	25,318,732	86,444
Gross receipts	£777,328	£60,629	£98,823	£109,560	£149,457	£2,588	£1,605	£339,211	£1,506
Receipts per passenger journey	5.83d.	22.39d.	22.03d.	18.10d.	14.26d.	31.54d.	2.48d.	3.22d.	4.18d.
<b>Reduced fares—</b>									
Excursion and week-end—									
Passenger journeys	34,352,137	3,798,448	7,625,360	11,970,956	7,683,505	367,248	113,304	1,159,048	633,234
Gross receipts	£1,775,021	£275,592	£395,736	£648,700	£372,347	£19,661	£855	£24,880	£9,195
Receipts per passenger journey	12.40d.	17.41d.	12.46d.	13.01d.	11.63d.	12.85d.	1.81d.	5.15d.	3.48d.
<b>Workmen—</b>									
Passenger journeys	25,829,987	1,894,864	3,479,050	6,958,476	5,429,022	235,932	209,716	6,524,596	206,436
Gross receipts	£374,282	£28,023	£55,968	£110,608	£89,333	£4,049	£1,699	£72,132	£1,862
Receipts per passenger journey	3.48d.	3.55d.	3.86d.	3.81d.	3.95d.	4.12d.	1.94d.	2.65d.	2.16d.
<b>Other descriptions—</b>									
Passenger journeys	3,344,882	401,053	855,520	951,295	618,254	46,658	1,312	397,234	10,859
Gross receipts	£211,451	£34,268	£51,387	£66,386	£50,811	£2,685	£6	£3,461	£135
Receipts per passenger journey	15.17d.	20.51d.	14.42d.	16.75d.	19.72d.	13.81d.	1.10d.	2.09d.	2.98d.
<b>Total—</b>									
Passenger journeys	95,548,314	6,744,322	13,037,104	21,334,342	16,246,096	669,543	479,691	33,399,610	936,973
Gross receipts	£3,140,869	£398,512	£602,807	£936,799	£662,269	£28,998	£4,165	£439,680	£12,698
Receipts per passenger journey	7.89d.	14.18d.	11.10d.	10.54d.	9.78d.	10.39d.	2.08d.	3.16d.	3.25d.

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

## NOTES AND NEWS

**Bow Road Station, L.N.E.R.**—The L.N.E.R. announces that on and from May 5, Bow Road station will be closed on Sundays.

**British Railways at the Ideal Homes Exhibition.**—The British railways are arranging to provide a stand at the Ideal Homes Exhibition, demonstrating the removal of household furniture by the rail-road container system.

**Assam-Bengal Railway Co. Ltd.**—On March 8, the offices of the company will be removed from Bishopsgate House, 80, Bishopsgate, E.C.2, to 56, Victoria Street, S.W.1. The telegraphic address will be Assamese, Sowest, London, and the telephone number: Victoria 0127.

**January Travel Figures.**—Official travel figures for January show that the Silver Jubilee Year has opened auspiciously with a further increase in the number of visitors to this country. The totals from all countries are up, excepting only Russia. The number of holiday visitors was 7,960, an increase of 767 over the corresponding total for 1934. Business visitors number 7,517, an increase of 631. The combined totals of holiday and business visitors (15,477) show an increase of 1,398.

**New Train Warming and Cleaning Sheds at Southampton Docks.**—A special train warming and cleaning shed is to be built by the Southern Railway behind the passenger and cargo sheds 103 and 104, at Southampton docks. The new shed, which will enable boat trains to be heated to the same temperature as that of the liner from which the passengers will disembark, will be 759 ft. long by 98 ft. wide. It will accommodate six boat trains, each consisting of 12 bogie coaches, on six lines of railway. In this shed the necessary train cleaning will also be carried out, and an annexe 108 ft. long by 15 ft. wide will be built to provide for the necessary offices and equipment.

**New L.M.S.R. Steamers.**—The *Sieve League*, built by Denny & Brothers, Dumbarton, was commissioned on the Holyhead and Dublin (North Wall) cargo and livestock service on Tuesday, February 26. The new vessel is of 1,343 gross tonnage, has a length of 309.5 ft., breadth of 44.5 ft., and cargo and cattle-carrying capacities of 500 tons and 650 head respectively. She is driven by two sets of Parsons turbines and single reduction gear driving twin screws and giving the vessel a speed of 17 knots. Steam is provided by two Babcock & Wilcox water-tube boilers working at 225 lb. per sq. in. The steamer is fitted with modern machinery to expedite loading and discharge of cargo. Special features include sliding gangway doors, plastic rubber decks, and Fleming's self-pro-

pelled lifeboats. The *Marchioness of Lorne*, a paddle steamer for the L.M.S.R. passenger and cruising service on the Firth of Clyde, was launched on February 19 from the yard of the Fairfield Shipbuilding & Engineering Co. Ltd., Govan.

**Highway Development Survey.**—The offices of Sir Charles Bressey, C.B., Engineer in Charge of the Highway Development Survey (Greater London), will be at 10, Smith Square, Westminster, S.W.1 (telephone number Victoria 2587), on and after March 1.

**R.A.A. Cross-Country Race.**—The annual five-mile cross-country race of the Railways Athletic Association for the Individual, London Area, Provincial Area, and Railway Group championships, is to take place on March 16, from the Royal Air Force Station, Ruislip, starting at 3 p.m. Mr. J. F. Lean, G.W.R., will officiate as starter.

**British Industries Fair.**—In order to meet the convenience of exhibitors and visitors attending the British Industries Fair at Olympia, the White City, and, from May 20 to 30, at Birmingham, the British railways, in co-operation with the Fair authorities, have arranged for the provision of railway inquiry bureaux, where information about rail facilities will be readily afforded.

**The Harwich-Zeebrugge Service.**—The L.N.E.R. announces that the Harwich-Zeebrugge service will be in operation this year from June 28 to September 10, with a daily direct sailing (including Sundays) in both directions. The service will be maintained by the ss. *Archangel* and *St. Denis*, and cheap week-end and period excursion tickets will be issued. The boat train will leave

Liverpool Street at 8.15 p.m. for Harwich (Parkeston Quay), and the boat will leave the Quay at 11.0 p.m., arriving at Zeebrugge at 6.0 a.m.

**Railway Benevolent Institution.**—It has been arranged to hold a special meeting of subscribers in the board room, Railway Clearing House, 123, Seymour Street, London, N.W.1 at 4.45 p.m., on March 18 next (a) to elect a treasurer; and (b) to submit proposals to alter Rules 50, 54, and 63 to enable children to be admitted to school privileges from the age of five years instead of six years.

**Road Accidents.**—The Ministry of Transport return for the week ended February 16 of persons killed or injured in road accidents is as follows:—

	Killed	Deaths resulting from previous accidents	Injured
England	79 (84)	23 (27)	2,927 (2,892)
Wales ...	4 (4)	1 (1)	102 (123)
Scotland	13 (7)	1 (4)	322 (304)
	96 (95)	25 (32)	3,351 (3,319)

The total fatalities for the week were, therefore, 121, as compared with 127 for the previous week.

**Another American Flyer.**—The fifth U.S.A. streamlined internal-combustion engined train (illustrated below) has just been delivered to the Boston & Maine Railroad, on which system it is to go into express service between Boston, Portland, and Bangor. Known as the Flying Yankee, the new train is a triple-articulated unit built up on the Budd shot-welded process, and is in many ways similar to the Burlington Zephyr. The engine is of the 600 b.h.p. Winton two-stroke type, and the train has accommodation for 140 passengers, and includes a buffet and lounge, in a length of 199 ft. and in a weight of 96 tons. The whole of the passenger



Triple-articulated diesel-engined train for the Boston and Maine Railroad



room is completely air-conditioned on the Frigidaire system.

**Return of the "Cock o' the North."**—The L.N.E.R. locomotive, *Cock o' the North*, returned from France via Harwich last week on board the train ferry No. 3.

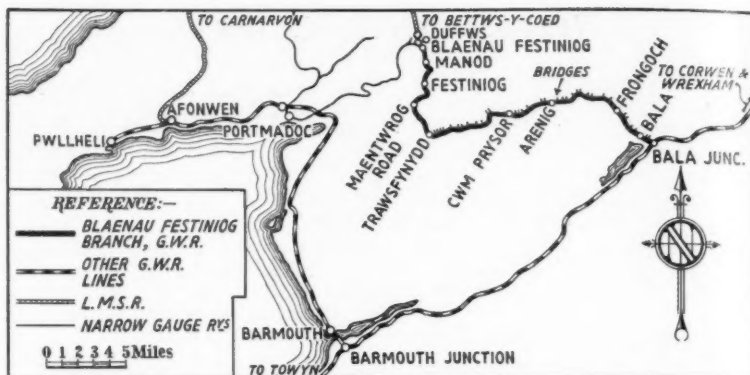
**Czechoslovak Fare Reductions.**—A 50 per cent. fare reduction on the Czechoslovak railways, and reductions on foreign railways and steamship and air lines, are to be provided for the Prague International Fairs, which are being held from March 10 to 17 and from September 1 to 8.

**Lynton & Barnstaple Railway.**—On February 22, the Lynton Council passed a resolution appealing to the Southern Railway not to close the narrow gauge line between Lynton and Barnstaple, Devon. The Southern Railway has not confirmed the impression in North Devon that the closing of this line at the end of the summer season is contemplated.

**Exhibitions of Railway Photographs.**—Of the 75 railway photographs which have been on exhibition at the Ilford Galleries, London, until yesterday (Thursday), 50 will be on show during March at the premises of R. A. Flemming & Co. Ltd., of Liverpool, and during April at Thompson & Clapper, of Manchester. Twenty of the pictures will be sent during March to Bryanston School, Blandford. The selection has been arranged by Mr. John H. L. Adams.

**L.N.E.R. Boxing Championships at York.**—On Wednesday, March 6, at the Railway Institute Gymnasium, York, the L.N.E.R. amateur boxing champions will be called upon to defend their titles against their own work-mates. There will be contests at flyweight, bantam weight, feather weight, lightweight, welterweight, middleweight and heavyweight. The winner of any championship will receive a silver challenge cup (to be held for one year) and a gold medal; each runner-up is presented with a silver medal.

**Russian Railway Commemorative Stamps.**—Twice previously Russia has issued postage stamps illustrating locomotives, but only in connection with portraying methods of transport. The Soviet Authorities have now issued a special set of stamps to commemorate the completion of Section I of the Metropolitan Railway of Moscow. The new stamps, four in number, show



Bridges on the Blaenau Festiniog branch, G.W.R., to be reconstructed during the present year

trains, stations, tunnels, and escalators to platforms.

**New York Rapid Transit.**—A Reuters message from New York states that, after protracted negotiations, an agreement has been reached between the City of New York and the Brooklyn-Manhattan Transit Corporation for the purchase of the corporation's rapid transit subway and elevated railway lines, power plant, and services at a net price of £37,000,000.

**Congo-Ocean Services.**—The Government of French Equatorial Africa has come to an agreement with the International Sleeping Car Company for the regular operation of sleeping and dining car services between Pointe Noire and Brazzaville, on a schedule which will be 12 to 14 hours for the 320 miles. A number of corridor carriages and refrigerator vans are on order for early delivery to the Congo-Ocean Railway.

**Astonishing Locomotive Performance in France.**—In the second instalment of this article which appeared in last week's issue of THE RAILWAY GAZETTE, it was stated at the end of the section dealing with the performance on the Etat that "during the past summer the night express to Lannion (No. 599) was made up to 878 tons and worked by a 4-8-2 with assistance." This was an error, and it should have read "without assistance."

**Blaenau Festiniog Branch Bridge Reconstruction.**—The G.W.R. programme for 1935 (recorded on page 26 of our January 4 issue) includes the rebuilding of some 130 bridges. Of the numerous bridges to be reconstructed and strengthened during the present year in various parts of the G.W.R.

system, as many as 34 are on the Blaenau Festiniog line between Bala and Trawsfynydd, as shown on the accompanying sketch map. The reconstructions on that branch are in connection with the running of heavier and more powerful locomotives.

#### U.S.A. Research Advisory Board.

—A Research Advisory Board of the Association of American Railroads has just been formed for the purpose of assisting in the organisation of the new department of planning and research which the Association of American Railroads is forming. It will also advise as to any plans for research the association may have in contemplation and for continuing research activities already in progress by the railroads. The third function of the new board will be to suggest new subjects for attention in regard to operation, equipment, or other activities connected with railway transportation.

#### Southern Railway Continental Services Poster.

—The comfort of travelling to Paris overnight by the Southern Railway service is attractively indicated in a striking coloured poster just issued by the company where, through a steamer's porthole, one gets a glimpse of a recumbent figure in a cosy-looking sleeping berth. At the head of the poster are three small letter-press tablets relating to the various services, namely: Every night from Victoria via Dieppe to Paris (St. Lazare); Monday, Wednesday, and Friday nights, from Waterloo via Havre to Paris (St. Lazare); and every night, Sundays excepted, from Victoria via Dunkerque to Paris (Nord).



Set of new Soviet postage stamps issued in connection with the completion of the first section of the Moscow underground railway

## British and Irish Traffic Returns

GREAT BRITAIN	Totals for 8th Week			Totals to Date		
	1935	1934	Inc. of Dec.	1935	1934	Inc. or Dec.
L.M.S.R. (6,926½ mls.)	£	£	£	£	£	£
Passenger-train traffic...	378,000	377,000	+ 1,000	2,900,000	2,860,000	+ 40,000
Merchandise, &c. ...	448,000	457,000	- 9,000	3,463,000	3,505,000	- 42,000
Coal and coke ...	261,000	278,000	- 17,000	2,155,000	2,187,000	- 32,000
Goods-train traffic ...	709,000	735,000	- 26,000	5,618,000	5,692,000	- 74,000
Total receipts ...	1,087,000	1,112,000	- 25,000	8,518,000	8,552,000	- 34,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	250,000	248,000	+ 2,000	1,946,000	1,909,000	+ 37,000
Merchandise, &c. ...	308,000	324,000	- 16,000	2,427,000	2,500,000	- 73,000
Coal and coke ...	244,000	264,000	- 20,000	1,965,000	2,023,000	- 58,000
Goods-train traffic ...	552,000	588,000	- 36,000	4,392,000	4,523,000	- 131,000
Total receipts ...	802,000	836,000	- 34,000	6,338,000	6,432,000	- 94,000
G.W.R. (3,749½ mls.)						
Passenger-train traffic...	153,000	151,000	+ 2,000	1,238,000	1,209,000	+ 29,000
Merchandise, &c. ...	177,000	177,000	-	1,406,000	1,382,000	+ 24,000
Coal and coke ...	107,000	117,000	- 10,000	854,000	897,000	- 43,000
Goods-train traffic ...	284,000	294,000	- 10,000	2,260,000	2,279,000	- 19,000
Total receipts ...	437,000	445,000	- 8,000	3,498,000	3,488,000	+ 10,000
S.R. (2,172 mls.)						
Passenger-train traffic...	233,000	228,000	+ 5,000	1,857,000	1,813,000	+ 44,000
Merchandise, &c. ...	58,000	66,500	- 8,500	445,500	486,500	- 41,000
Coal and coke ...	36,000	40,500	- 4,500	283,500	305,500	- 22,000
Goods-train traffic ...	94,000	107,000	- 13,000	729,000	792,000	- 63,000
Total receipts ...	327,000	335,000	- 8,000	2,586,000	2,605,000	- 19,000
Liverpool Overhead ...	1,110	1,107	+ 3	8,802	8,842	- 40
(6½ mls.)						
Mersey (4½ mls.) ...	3,903	3,899	+ 4	33,402	34,151	- 749
*London Passenger Transport Board ...	529,500	513,500	+ 16,000	18,047,400	17,695,900	+ 351,500
IRELAND						
Belfast & C.D. pass.	1,694	1,744	- 50	13,989	14,196	- 207
(80 mls.)						
" " goods	485	545	- 60	3,671	4,142	- 471
" " total	2,179	2,289	- 110	17,660	18,338	- 678
Great Northern pass.	7,450	6,450	+ 1,000	61,100	56,250	+ 4,850
(543 mls.)						
" " goods	7,700	8,650	- 950	63,350	64,050	- 700
" " total	15,150	15,100	+ 50	124,450	120,300	+ 4,150
Great Southern pass.	17,463	16,722	+ 741	146,568	146,083	+ 485
(2,124 mls.)						
" " goods	30,596	32,301	- 1,705	299,954	254,185	+ 45,769
" " total	48,059	49,023	- 964	446,522	400,268	+ 46,254

\* 34th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes

## Forthcoming Events

Mar. 1 (Fri.).—Institute of Transport (Leeds), at Town Hall, 6.30 p.m. "The Working of the South Wales Docks," by Mr. L. E. Ford.

Institute of Transport (Nottingham Graduate), at Guildhall, 7 p.m. "Economic Theory and Transport Co-ordination," by Mr. A. Radford.

Institution of Locomotive Engineers (London), at Trocadero Restaurant, Shaftesbury Avenue, W.1, 6.30 for 7 p.m. Annual Dinner.

L.N.E.R. (King's Cross) Literary Society, at Queen's Hall, Langham Place, London, W.1, 7.30 p.m. Smoking Concert.

Mar. 4 (Mon.).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. "The Future of Railways," by Mr. E. Godfrey.

Permanent Way Institution (York), at Railway Inst., Queen Street, 6.30 p.m. "The Relationship between Signal and Permanent Way Maintenance," by Mr. J. H. Fraser.

Railway Students' Association (Edinburgh), at Gold Hall, St. Andrew Square, 8 p.m. "Railway Land and Property," by Mr. A. Watson.

Mar. 5 (Tues.).—Federation of N.E. Area Lecture and Debating Societies, at Railway Inst., Queen Street, York, 7 p.m. "Goods Train Working."

Institute of Transport (Bristol). Visit of the President.

Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "Progress in Motor Transport," by Mr. W. G. Foulke.

Mar. 6 (Wed.).—Railway Students' Association (Edinburgh), at Caledonian Station Hotel, 7 p.m. Annual Supper.

Mar. 6-7.—Institute of Metals, at Inst. of Mechanical Engineers, Storey's Gate, London, S.W.1. Annual General Meeting.

Mar. 7 (Thurs.).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. "Three Hundred Years of Transport—the Story of Pickfords," by Mr. S. H. James.

Institute of Transport (Metropolitan Graduate), at "Windsor Castle," Victoria, S.W.17, for 7.15 p.m. Annual Reunion.

Mar. 8 (Fri.).—Institute of Transport (Newcastle), at Royal Station Hotel, 7.30 p.m. "The Industrial Transport Manager and Distribution," by Mr. J. W. Porter.

Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 7 p.m. "Recent Work in Testing Steel of Mild and Moderate Tensile Strength," by Prof. B. P. Haigh.

May 31 (Fri.).—Banquet to celebrate Colonel R.E.B. Crompton's ninetieth birthday, Sir Arthur Stanley, G.B.E., C.B., M.V.O., in the chair. All information from Mr. E. J. Fox, Hon. Sec. and Treasurer, The Manor House, Stanton-by-Dale, Nottingham.

## British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices	
			Feb. 27, 1935	Rise/Fall
G.W.R.				
Cons. Ord. ...	661½	481½	48½	-1½
5% Con. Prefce. ...	118	109	116½*	-1½
5% Red. Pref. (1950) ...	115	107	112½*	-1½
4% Deb. ...	117	105	112½	-1
4½% Deb. ...	119	109	117½	-1
4½% Deb. ...	129½	115½	125½	-1
5% Deb. ...	135	126½	138½	-1
2½% Deb. ...	75	64	81½	-
5% Rt. Charge ...	1347½	123½	133½	-
5% Cons. Guar. ...	132¾	121¾	130½*	-1
L.M.S.R.				
Ord. ...	301½	191½	17	-1
4% Prefce. (1923) ...	64½	41	46*	-2
4% Prefce. ...	87	69½	77*	-3
5% Red. Pref. (1955) ...	107	92½	101½	-2
4½% Deb. ...	114½	100½	104	-½
5% Red. Deb. (1952) ...	118½	111½	117½	-1
4% Guar. ...	106½	96½	98½*	-1½
L.N.E.R.				
5% Pref. Ord. ...	245½	131½	111½	-½
Def. Ord. ...	111½	67½	55½	-½
4% First Prefce. ...	76	59½	66	-½
4% Second Prefce. ...	47	25½	23	-2
5% Red. Pref. (1955) ...	94½	80	86½	-1
4% First Guar. ...	104	92	96½	-2
4% Second Guar. ...	97½	86½	89½	-3
3% Deb. ...	90	74½	79½	-1
3% Deb. ...	114	99½	102½	-1
5% Red. Deb. (1947) ...	117	108	115½	-
4½% Sinking Fund Red. Deb. ...	111½	105½	110½	-
SOUTHERN				
Pref. Ord. ...	90	63½	78*	-2
Def. Ord. ...	325½	19	20	-1
5% Prefce. ...	118½	107½	116½*	-1
5% Red. Pref. (1964) ...	115½	107½	114½*	-
5% Guar. Prefce. ...	132	120½	129½*	-2
5% Red. Guar. Pref. (1957) ...	119½	113	117½*	-½
4% Deb. ...	116½	103½	111½	-1
5% Deb. ...	134	124½	136½	-
4% Red. Deb. ...	113½	105½	112½	-
1962-67				
BELFAST & C.D.				
Ord. ...	6	5	5½	-
FORTH BRIDGE				
4% Deb. ...	110	100	109½	-
4% Guar. ...	110	100	109½	-
G. NORTHERN (IRELAND)				
Ord. ...	95½	415½	10	-
G. SOUTHERN (IRELAND)				
Ord. ...	25	12½	24½	-
Prefce. ...	21½	13½	27½	-1½
Guar. ...	48	39	59½	-½
Deb. ...	67	59	75	-
L.P.T.B.				
4½% "A" ...	126	115	122½	-1
5% "A" ...	135½	124½	132½	-2
4½% "T.F.A." ...	113½	107½	112	-½
5% "B" ...	131½	118	124½	-1
5% "C" ...	97	73	93*	-
MERSEY				
Ord. ...	15½	7	14	-
4% Perp. Deb. ...	93½	82½	94½	-
3% Perp. Deb. ...	66½	61½	69½	-
3% Perp. Prefce. ...	54	44½	52½	-

\* ex dividend

## CONTRACTS AND TENDERS

Thomas Hunter Limited and the Butterley Co. Ltd. have each received orders from Spencer, Abbott & Co. Ltd. for 50 12-ton coal wagons.

### L.N.E.R. Wagon Orders

The L.N.E.R. has placed orders for a total of 2,000 12-ton wagons as follow :—

Charles Roberts & Co. Ltd. : 500 covered wagons.  
Metropolitan-Cammell Carriage & Wagon Co. Ltd. : 250 covered wagons.

Birmingham Railway Carriage & Wagon Co. Ltd. : 250 covered wagons.

Hurst Nelson & Co. Ltd. : 250 covered and 250 open wagons.

R. Y. Pickering & Co. Ltd. : 250 covered wagons.  
Cravens Railway Carriage & Wagon Co. Ltd. : 250 open wagons.

The whole of these wagons will be fitted with the Vacuum brake for operation in fast goods traffic.

D. Wickham & Co. Ltd. has received an order from the Peruvian Corporation for one No. 5 petrol-driven inspection rail trolley.

The Associated Equipment Co. Ltd. has received repeat orders from the City of Oxford Motor Services Limited for six oil-engined Regent double-decked vehicles and 12 oil-engined Regal single-decked vehicles.

### Diesel Railcars for G.W.R.

The chairman of the Great Western Railway Company, in his speech to the shareholders at Wednesday's annual general meeting stated that his company had ordered 10 more diesel railcars. Particulars of those already in service, which were supplied by the Associated Equipment Co. Ltd. last year, were given in our *Diesel Railway Traction Supplements* of June 15 and July 13, 1934. Sir Robert Horne's statement on Wednesday on this subject is set out in the report of the meeting given elsewhere in this issue.

C. M. Hill & Co. Ltd. has received orders for one 8½ in. centres × 12 ft. bed lathe and one bench screwing machine from the Peruvian Corporation.

Dempster Moore & Co. Ltd. has received an order for a 10-in. centres × 10 ft. bed self-acting, sliding, surfacing and screw-cutting gap bed lathe from the Peruvian Corporation.

W. Evans & Co. has received an order from the Indian Stores Department for 14 B.T. crank axles at a total price of Rs. 25,561.

Leyland Motors Limited has received an order from the L.M.S.R. Northern Counties Committee for one 0-6-0 diesel shunting locomotive, fitted with a Leyland hydraulic torque converter.

Alfred Herbert Limited has received orders from the Indian Stores Department for one hand lever punching machine with rolled steel flat frame; one hand lever splitting shears with rolled steel plate frame for cutting plates, size 16; and one high-speed crank shaping machine.

Metal Traders Co. Ltd. has received an order from the Egyptian State

Railways Administration for 64 metric tons of tin ingots at a total cost of £14,708 13s. 3d. f.o.b. London.

The Egyptian State Railways Administration has recently placed the following orders for oils :—

Thos. Hinshelwood & Co. Ltd. and C. C. Wakefield & Co. Ltd. : Cylinder oil.

The Shell Co. of Egypt, Ltd. : Bearing oil, internal combustion engine oil and benzine.

The Socony Vacuum Oil Co. Ltd. : Engine oil for steam railcars and internal combustion engine oil.

### Additional Locomotives for Egypt

The Egyptian State Railways Administration's insistence on the necessity for the acquisition of fifteen new 4 ft. 8½ in. gauge locomotives for the Upper Egypt auxiliary railways has been successful. The Railway Board approved the purchase of ten engines in the latter part of last year (see our Overseas Railway Affairs section, page 702, November 2, 1934 issue), but the position being so acute, further application for the additional five was made, and permission for these has now been granted. It is expected that tenders for these engines will shortly be invited.

Bayliss, Jones & Bayliss Limited has received orders for 70,000 steel fishbolts, nuts and washers, together with a quantity of bolts and nuts for switches and crossings from the Central Uruguay Railway.

### Machine Shop Equipment for China

Orders for £200,000 worth of machine-shop equipment will be placed with British firms as the result of the annual meeting of the Chinese Government's Purchasing Commission, which was held at the Chinese Legation on February 25, states Reuters. The Chinese Minister presided, and there were present Sir Ralph Wedgwood, Sir Arthur Balfour, Sir Basil Blackett, and Dr. C. C. Wang. The report for 1934 showed that orders placed with British firms were substantially bigger than in 1933. The value of the year's contracts was £1,849,979, bringing the total value of orders since the Commission began work to £2,915,025. The total tonnage of materials shipped during the year was 89,437.

W. G. Bagnall & Co. Ltd. has received an order from the Great Indian Peninsula Railway for two A/1 class locomotive boilers to be supplied to the inspection of the consulting engineers, Messrs. Rendel, Palmer & Tritton.

The Royal Hungarian Iron Steel & Machine Works has received orders from the Great Indian Peninsula Railway for 28 boilers for HS/10 locomotives and six boilers for Y/6 locomotives, to be supplied to the inspection of the consulting engineers, Messrs. Rendel, Palmer & Tritton.

Jessop & Co. Ltd. has received an order from the Indian Stores Department for 200 carriage and wagon tyres and 110 locomotive tyres at a total price of Rs. 21,313.

The Ingersoll Rand Co. Ltd. has received an order for an air lift pumping installation for a 6-in. diam. × 300 ft. depth well, from the Great Western of Brazil Railway.

Ingersoll Rand (India) Limited has received an order from the Indian Stores Department for two oil-engine-driven air compressor sets at a total price of Rs. 28,000, free delivery.

Guest, Keen Williams Limited has received an order from the Bengal-Nagpur Railway for 234,000 ft. of welding electrodes. This firm has also received an order from the Indian Stores Department for 70 tons of mild steel round.

The South Indian Railway has placed orders, to the inspection of the consulting engineers, Messrs. Robt. White & Partners, as follow :—

Metropolitan-Cammell Carriage & Wagon Co. Ltd. : 150 screw couplings for broad gauge carriages and wagons.

Incandescent Heat Co. Ltd. : Oil-fired muffle furnace.

Thos. F. Johnson : Approximately 360 doz. brushes.

Shaw Wallace & Co. Ltd. has received an order from the Indian Stores Department for 28 engine axles at total price of Rs. 23,900; and 36 carriage and wagon axles at total price of Rs. 5,198.

Wright Pinhorn & Partners Ltd. has received orders from the Indian Stores Department for 120 broad-gauge carriage and wagon tyres; and 18 metre-gauge and 25 broad-gauge locomotive tyres at a total price of Rs. 14,583.

The Egyptian State Railways Administration invites tenders, closing on April 16, for the supply of 25,000 metric tons of sized coal for power houses.

## Forthcoming Meetings

Mar. 1 (Fri.).—London Midland & Scottish Railway (Annual General), Friends House, Euston Road, N.W.1, at 11.30 a.m.

Mar. 8 (Fri.).—Great Southern Railways (Ordinary General), Gresham Hotel, Upper O'Connell Street, Dublin, at 2 p.m.

Mar. 8 (Fri.).—London & North Eastern Railway (Ordinary General), Hotel Great Central, Marylebone, N.W.1, at 2 p.m.

Mar. 26 (Tues.).—Ottoman Railway from Smyrna to Aidin (Half-yearly Ordinary General), Winchester House, Old Broad Street, E.C. 2, at 11 a.m.

Mar. 26 (Tues.).—Temiscouata Railway (Annual General), Chateau Frontenac, Quebec, at 12 noon.

Mar. 29 (Fri.).—Zafra & Huelva Railway (Ordinary General), Calle de Ayala 54 Bajo Derecha, Madrid, at 5 p.m.

L.M.S.R. HALF-DAY EXCURSIONS.—Returns for the past year indicate a further large increase in the number of passengers carried by L.M.S.R. half-day and evening excursion trains. As compared with the previous year, the number of passengers increased by 906,090, an advance of over 33 per cent. The number of trains run was increased by 3,375.



## Conveyance of Racehorses

The Appeal Tribunal under the Road and Rail Traffic Act, Mr. T. Rowand Harker, K.C., presiding, on Monday resumed the hearing at York of an appeal by the L.N.E.R., against the grant of an "A" licence to Mr. Peter Kelly, of Norton, Malton, by which the respondent is enabled to run a road motor horse box for the conveyance of racehorses to and from the training stables at Malton. It was stated in the application before the Yorkshire Traffic Commissioners that the grant to the respondent had affected the employment of the railway company's motor vehicles and it was now contended that the existing facilities provided by the company were adequate and efficient.

Mr. H. R. B. Shepherd, for the respondent, called several trainers at Malton, who said they preferred to send their horses by road. Walter Easterby, trainer, Norton, said that when the Yorkshire business of Daimler Hire Limited was acquired by the railway company in 1933 the service began to be less satisfactory. He was told on several occasions that he could not have a road box because they had gone to Beverley or to Middleham to other trainers. Captain Charles Elsey, of Highfield, Norton, another trainer, said they were accustomed to give only a day's notice when they wanted a box and he thought that should be sufficient.

Cross-examined by Mr. H. B. Pereira, for the railway company, he agreed that the service was adequate except on rush days. Up to 100 miles he preferred road but when he sent horses to London or to South Country meetings he used the rail. He sent them to King's Cross and thence by road vehicle to Ascot and Goodwood and other meetings.

Mr. Harold Bazley, representative for the Trainers' association for the area, said the service provided by the company was not adequate and with all the horses now being trained there would not be enough boxes, without Mr. Kelly's. In answer to Mr. Pereira he said he did not know that the railway company had fifteen boxes for road services for horses between Beverley and Middleham. It was only one reason for his complaint that he was afraid that if the railway had a monopoly it might put the prices up again as it did before; there were other reasons.

Mr. Pereira called the stationmaster at Malton, Mr. J. Proudfoot, who gave rebutting evidence as to the alleged deficiencies in the facilities, and who said there had been no complaints. He had records of all the applications for road boxes and denied there had been failure to supply.

Mr. Shepherd, for the respondents, submitted that there had been ample evidence of the inadequacy of the

service of road vehicles owned by the railway and that such inadequacy justified the granting of the licence to the respondent.

Mr. Pereira contended that the respondent had failed to show any inadequacy of facilities and the fact that his witnesses wished Kelly to have the licence for other reasons—the possible raising of rates for instance—had nothing whatever to do with the appeal, especially as not a single instance had been proved of a complaint in writing about the service of the appellants.

The Tribunal postponed its finding until Wednesday, and in the meantime asked to be supplied by the railway company with a complete list of employment of all their road boxes on every day of flat racing in 1934 from the first day of the Lincoln meeting in March to the last day of the November handicaps in Manchester.

In delivering judgment at York on Wednesday, Mr. Rowand Harker, K.C.,

the President, said that the tribunal had decided to allow the appeal, but made no order as to costs. The tribunal was satisfied that for this particular class of traffic there must be adequate services of road boxes provided from Malton, but had come to the conclusion that the road service provided by the railway company were adequate to meet the reasonable needs of the trainers. He added that a letter from Mr. Bazley, a trainer, which he had sent round to other trainers, showed that the invitation to Kelly to run the service made no suggestion that the services of the railway company were inadequate, but that it was feared the railway company, if it had a monopoly, would increase the charges and would endeavour to force those who wanted road transport back to the rail. He had already expressed their view that there should be adequate road transport, and if the railway company was so ill-advised to raise its charges without complete justification, then that would be a matter for the Licensing Authority to take into consideration when the railway applied for a renewal of its licence.

## RAILWAY AND OTHER REPORTS

**London & North Eastern Railway.**—The Secretary writes, February 22:—"After reserving £538,000 to meet the cost of renewals of rolling stock on the 1934 programme not completed within that year and transferring £50,000 from general reserve as formerly, the directors recommend that, subject to final audit, dividends be paid on the 4 per cent. first preference stock at the rate of 3½ per cent., less income tax, and on the 5 per cent. redeemable preference stock at the rate of 4½ per cent., less income tax, leaving a balance of £43,033 to be carried forward. Warrants for the dividends on the 4 per cent. first preference and the 5 per cent. redeemable preference stocks will be posted on March 13."

**Vickers Limited.**—The directors give notice that the following final dividends for the half-year ended December 31, 1934, will be paid to the holders of the preferred stock and preference shares of the company who are regis-

tered in the books of the company on Saturday, March 2, 1935: 2½ per cent. on the preferred 5 per cent. stock (less income tax); 2½ per cent. on the 5 per cent. preference shares (less income tax); 2½ per cent. on the cumulative preference shares (free of income tax). Payment will be made on March 29.

**Manchester Ship Canal Company.**—The shareholders duly sanctioned declaration of the following dividends at the ordinary general meeting held on February 25, namely: 3½ per cent. on the Manchester Ship Canal Corporation preference stock, same as last year; 3½ per cent. on the preference shares as compared with 2 per cent. last year; and 1½ per cent. on the ordinary shares, as compared with 1 per cent. last year. £35,000 has been placed to reserve for contingencies and repairs, the same as last year, and £34,824 has been carried forward, as compared with £34,608 last year.

## Export of Railway Material from the U.K. in Jan.

	Jan. 1935	Jan. 1934
Locomotives, rail	60,948	25,429
Carriages and wagons	87,181	58,102
Rails, steel	69,601	46,822
Wheels, sleepers, fishplates and miscellaneous materials	79,444	60,854

Locomotive and rail exports included in the following:—

	Locomotives		Rails	
	Jan. 1935	Jan. 1934	Jan. 1935	Jan. 1934
Argentina	—	—	8,018	4,786
Union of South Africa	—	—	64,927	24,303
British India	3,215	—	24,999	8,802

## Railway Share Market

In the stock and share market there has been some irregularity of movement in prices owing to the ingathering of taxes, which usually makes itself felt for a few weeks at this time of year. The quiet condition of the markets is expected to pass very shortly. Meanwhile, interest in home railway stocks has not been sufficient to maintain the upward trend of prices, and many of the stocks, which it is confidently anticipated will be bought later in the year, are now being offered on a falling market.

Great Western ordinary stock, now "ex" dividend, is below the 50 level. Net available revenue for this stock is expected to show an increase for the current year, and therefore it should only

require a reduced transfer from reserve to make up the 3 per cent. dividend. The yield of 6 per cent. is about double the rate obtainable in the gilt-edged market, and the stock is, therefore, regarded as useful for "mixing" with other stocks of a higher grade with a view to raising the average yield on invested capital to around 4½ per cent. The figures of the London & North Eastern had a favourable influence on the market in the company's stocks, and there was a disposition to favour the long term prospects of the first preference stock on the estimate that the full 4 per cent. dividend will be earned in the current year. London Midland & Scottish 1923 preference stock and Southern preferred ordinary stock are probably two of the most favoured stocks in the market. It is being estimated that

the former will earn 3 per cent., or twice the amount earned on the stock in the past year, and that the Southern will earn the full 5 per cent. to which the preferred ordinary is entitled. London Passenger Transport Board's issues have been mostly weaker.

Foreign railway stocks still reflect an absence of public interest. There was a movement this week to stimulate interest in the prospects of the Argentine railway stocks by the circulation in the Stock Exchange of a "market slip" showing the possible scope for appreciation on the basis of various new factors of a favourable character. The prospect of a big maize crop and the likelihood of a reduced amount being required for meeting loss on exchange for the current financial year were two points brought out.

### Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1934-35	Week Ending	Traffic for Week		No. of Week	Aggregate Traffic to Date			Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1934		Totals		Increase or Decrease		Highest 1934	Lowest 1934	Feb. 27, 1935	Yield % (See Note)			
						This Year	Last Year									
South & Central America.	Antofagasta (Chili) & Bolivia	830	24.2.35	13,310	—	£ 1,440	8	95,910	95,000	+	£ 910	Ord. Stk.	265½	19	19	NH
	Argentine North Eastern	753	23.2.35	6,627	—	68	34	246,584	288,916	—	42,332	A. Deb.	11	67½	50	NH
	Argentine Transandine ..	111	—	—	—	—	—	—	—	—	—	6 p.c. Db.	10	10½	10	NH
	Bolivar .. .. .	174	Jan., 1935	5,850	—	700	4	5,850	6,550	—	700	Bonds.	138½	107½	13	31½
	Brazil .. .. .	—	—	—	—	—	—	—	—	—	—	Ord. Stk.	16½	8½	8	NH
	Buenos Ayres & Pacific	2,806	23.2.35	97,755	+	8,197	34	2,442,357	2,826,700	—	384,343	Mt. Db.	23	10	21½	NH
	Buenos Ayres Central ..	190	10.2.35	\$86,200	+	\$24,700	32	\$3,633,300	\$3,649,400	—	\$16,100	Ord. Stk.	35	22	26	NH
	Buenos Ayres Gt. Southern	5,085	23.2.35	203,308	+	29,024	34	4,688,656	5,466,838	—	778,182	"	27½	18½	22½	NH
	Buenos Ayres Western ..	1,930	23.2.35	53,160	+	5,308	34	1,468,535	1,776,579	—	308,044	"	23	13½	17	NH
	Central Argentine ..	3,700	23.2.35	124,442	+	17,867	34	4,010,922	4,605,597	—	594,675	Divd.	14	7	8	NH
	Do.	—	—	—	—	—	—	—	—	—	—	Ord. Stk.	15½	8	8½	NH
	Cent. Uruguay of M. Video	273	23.2.35	19,395	+	1,092	34	573,223	555,522	+	17,701	—	—	—	—	—
	Do. Eastern Extn.	311	23.2.35	4,067	+	68	34	121,558	109,484	+	12,074	—	—	—	—	—
	Do. Northern Extn.	185	23.2.35	2,634	+	476	34	65,754	59,712	+	6,042	—	—	—	—	—
	Do. Western Extn.	211	23.2.35	1,741	+	426	34	52,435	55,202	—	2,767	—	—	—	—	—
	Cordoba Central ..	1,218	23.2.35	23,690	+	480	34	987,690	1,206,430	—	218,740	Ord. Inc.	6	3	3½	NH
	Costa Rica .. ..	188	Dec., 1934	18,046	+	2,804	26	99,051	114,966	—	15,915	Stk.	305½	23½	31½	65½
	Dorada .. .. .	70	Jan., 1935	10,500	—	1,200	4	10,500	11,700	—	1,200	1 Mt. Db.	103	95	102½	57½
	Entre Rios .. ..	810	23.2.35	12,380	+	1,992	34	429,677	446,684	—	17,007	Ord. Stk.	21½	12	14½	NH
	Great Western of Brazil	1,082	23.2.35	11,500	+	2,500	8	90,000	87,700	+	2,300	Ord. Sh.	16	3½	—	—
	International of Cl. Amer.	794	Dec., 1934	\$410,865	—	\$1,049	52	\$4,722,779	\$4,537,682	+	\$185,097	—	—	—	—	—
	Interoceanic of Mexico ..	223½	Jan., 1935	3,100	—	1,300	4	3,100	4,400	—	1,300	1st Pref.	1/-	1/-	1½	NH
	La Guaira & Caracas ..	1,918	16.2.35	20,373	—	422	7	159,156	147,345	—	11,811	Stk.	125½	76½	81½	NH
Leopoldina .. ..	483	21.2.35	\$251,800	+	\$27,200	7	\$1,767,200	\$1,531,600	+	\$235,600	Ord. Stk.	146½	7	7½	NH	
Midland of Uruguay ..	319	Jan., 1935	13,282	—	1,832	30	79,115	68,680	+	10,435	"	30½	1½	1½	NH	
Nitrate .. .. .	401	15.2.35	9,213	—	739	6	19,173	—	—	—	Ord. Sh.	369½	51½	25½	NH	
Paraguay Central ..	274	16.2.35	7,120	+	4,410	33	157,850	106,150	+	51,700	Pr. Li. Stk.	84	67	76½	71½	
Peruvian Corporation ..	1,059	Jan., 1935	65,309	+	6,580	30	436,825	388,420	+	48,405	Pref.	14½	8	8	NH	
Salvador .. .. .	100	16.2.35	\$34,400	—	\$5,580	33	\$577,152	\$583,583	—	\$6,431	Pr. Li. Db.	75	70	70	71½	
San Paulo .. ..	1,531½	17.2.35	33,869	+	6,062	7	217,484	202,844	+	13,640	Ord. Stk.	86	67	66	61½	
Taltal .. .. .	164	Jan., 1935	3,100	+	23	30	16,670	15,592	+	1,087	Ord. Sh.	26	17½	13½	51½	
United of Havana ..	1,365	23.2.35	48,110	+	16,666	34	666,985	487,500	+	179,485	Ord. Stk.	6	2	3½	NH	
Uruguay Northern ..	73	Jan., 1935	1,152	—	230	30	8,446	8,305	+	141	Deb. Stk.	6½	3	5½	NH	
Canada.	Canadian National ..	23,735	21.2.35	612,634	+	37,014	7	4,251,701	3,969,906	+	281,795	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	—	—	—	Perp. Dbs.	78½	51½	70½	51½
	Grand Trunk .. ..	—	—	—	—	—	—	—	—	—	—	4 p.c. Gar.	104½	97½	100½	4
India.	Canadian Pacific ..	17,211	21.2.35	415,600	—	13,200	7	2,954,800	3,072,800	—	118,000	Ord. Stk.	185½	111½	12	NH
	Assam Bengal .. ..	1,329	26.1.35	30,367	+	1,888	43	1,165,346	1,014,258	+	151,088	Ord. Stk.	88½	72	86½	37½
	Barai Light .. ..	202	2.2.35	1,980	—	1,050	44	118,125	127,132	—	9,007	Ord. Sh.	104½	95½	104½	54½
Various.	Bengal & North Western	2,113	9.2.35	66,633	+	24,031	19	944,304	862,499	+	81,805	Ord. Stk.	297½	262	294½	57½
	Bengal Dooars & Extension	161	2.2.35	2,908	+	372	44	132,721	131,207	+	1,514	"	125½	124	126½	5½
	Bengal-Nagpur .. ..	3,269	26.1.35	124,950	—	10,888	43	4,796,064	4,448,406	+	347,658	"	105½	86	104½	31½
	Bombay, Baroda & Cl. India	3,072	16.2.35	187,050	—	13,200	46	7,229,400	6,904,950	+	324,450	"	115	108½	114½	54½
	Madras & South'n Mahratta	3,280	26.1.35	106,425	—	4,839	43	4,553,881	4,611,480	—	57,599	"	131	122½	127½	71½
	Rohilkund & Kumaon ..	572	9.2.35	13,559	+	1,042	19	186,268	176,148	+	10,120	"	263	250	281½	51½
	South India .. ..	2,526	9.2.35	87,512	+	10,606	45	3,563,084	3,469,117	+	93,967	"	119	115	116	67½
	Beira-Umtali .. ..	204	Dec., 1934	55,495	+	6,077	13	180,985	149,024	+	31,961	—	—	—	—	—
	Bilbao River & Cantabrian	15	Jan., 1935	2,249	—	702	4	2,249	1,547	+	702	—	—	—	—	—
	Egyptian Delta .. ..	621	10.2.35	7,241	—	104	45	210,365	206,432	+	3,933	Prf. Sh.	215½	15½	218	41½
Various.	Great Southern of Spain	104	16.2.35	1,350	—	259	7	14,125	14,859	—	734	Inc. Deb.	4	3½	3½	NH
	Kenya & Uganda ..	1,625	Jan., 1935	239,686	+	47,245	4	239,686	192,441	+	47,245	—	—	—	—	—
	Manila .. .. .	913	Dec., 1934	109,744	+	19,028	13	342,255	277,053	+	65,202	B. Deb.	50	33	46½	7½
	Mashonaland .. ..	277	Dec., 1934	14,518	—	767	26	85,947	80,396	+	5,551	1 Mt. Db.	101	91½	103	47½
	Midland of W. Australia	1,905	5.1.35	43,917	—	8,658	40	1,446,733	1,259,526	+	187,207	Inc. Deb.	100	93	96½	55½
	Nigerian .. .. .	1,538	Dec., 1934	181,616	+	32,520	13	556,652	465,394	+	91,258	4 p.c. Db.	104½	97½	105	31½
	Rhodesia .. .. .	13,217	2.2.35	541,751	+	83,486	44	22,706,205	20,005,801	+	2,700,404	—	—	—	—	—
	South African .. ..	6,172	Oct., 1934	893,146	—	75,686	17	3,032,823	2,938,131	+	94,692	—	—	—	—	—
	Victorian .. .. .	112	Dec., 1934	10,586	—	141	52	138,474	134,554	+	3,920	—	—	—	—	—
	Zafra & Huelva ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1½.

† Receipts are calculated @ 1s. 6d. to the rupee.

§ ex dividend.

Salvador receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value.